TRAI Audit Wireless Report for Maharashtra & Goa Circle

WEST ZONE

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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2 INTRODUCTION

2.1 ABOUT TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated December 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated October 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

2.2 OBJECTIVES

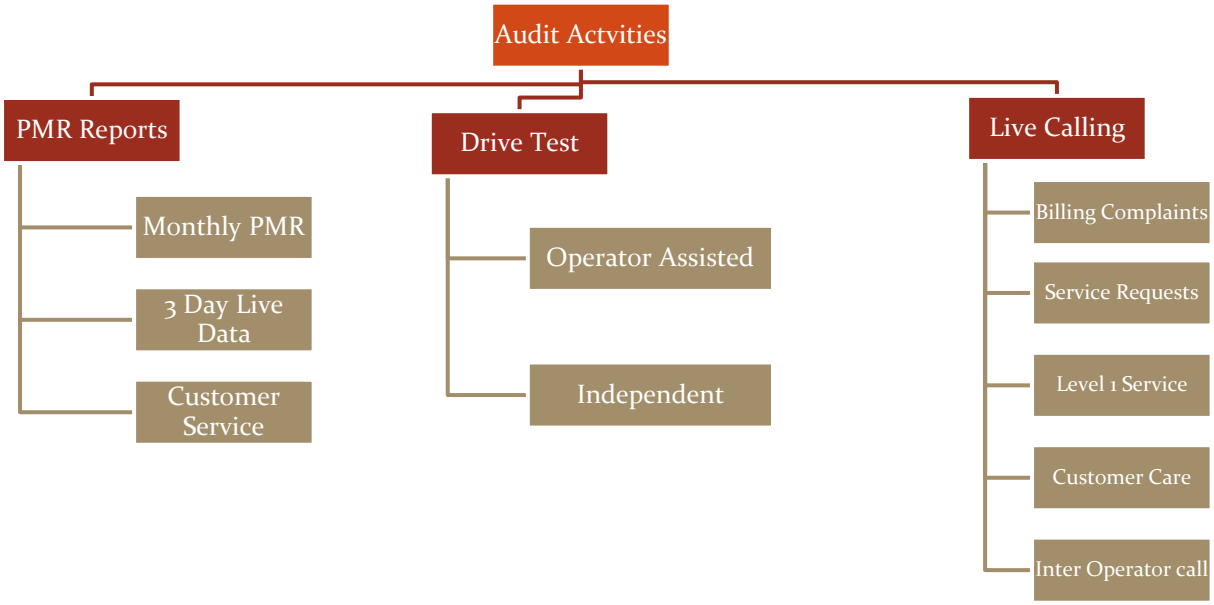
The primary objective of the Audit module is to-

- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in Maharashtra & Goa circle.

2.3 COVERAGE

The audit was conducted in Maharashtra & Goa circle covering all the SSAs (Secondary Switching Areas).

2.4 FRAMEWORK USED



Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.

The IMRB auditors inform the operators about the audit schedule in advance. Accordingly, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Billing /Customer Service etc).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly generated PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.

The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, January2016 audit data was collected in the month of February2016.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March2016 (JFM'16) was collected in the month of January2016.

The raw data extracted from operator's systems is used to create PMR in the following three formats.

- Monthly PMR (Network Parameters& Wireless Data Services) – 2G & 3G
- 3 Day Live Measurement Data (Network Parameters& Wireless Data Services)– 2G & 3G
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March2016.The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- SDCCH/Paging Channel Congestion
- TCH Congestion
- Point of Interconnection

Connection Maintenance

- Call Drop rate
- Worst affected cells having more than 3% TCH drop

Voice Quality

- % Connections with good voice quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

Let us now look at the various parameters involved in the audit reports.

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
Network Availability	**BTSs Accumulated downtime (not available for service)**	**≤ 2%**
	Worst affected BTSs due to downtime	**≤ 2%**
Connection Establishment (Accessibility)	**Call Set-up Success Rate (within licensee's own network)**	**≥ 95%**
	SDCCH/ Paging Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March2016.The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- Node Bs accumulated downtime
- Worst affected Node Bs due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- RRC Congestion
- Circuit Switched RAB Congestion
- Point of Interconnection

Connection Maintenance

- Circuit Switched Voice Drop rate
- Worst affected cells having more than 3% Circuit switched Voice drop rate

Voice Quality

- % Connections with good Circuit Switched Voice Quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

Let us now look at the various parameters involved in the audit reports.

Network Related

Network Parameters - 3G		
Network Availability	Node Bs downtime (not available for service)	≤ 2%
	Worst affected Node Bs due to downtime	≤ 2%
Connection Establishment (Accessibility)	Call Set-up Success Rate (within licensee's own network)	≥ 95%
	RRC Congestion	≤ 1%
	Circuit Switched RAB Congestion	≤ 2%
Connection Maintenance (Retainability)	Circuit Switched voice drop rate	≤ 2%
	Worst affected cells having more than 3% Circuit switched voice drop rate	≤ 3%
	%age of connection with good circuit switched voice quality	≥ 95%
	Point of Interconnection (POI)	0.5%

2.4.1.6 MONTHLY PMR – WIRELESS DATA SERVICES (2G & 3G)

The PMR report for wireless data service (2G and 3G) is extracted at the operator premises and verified every month of the quarter. This includes three parameters-

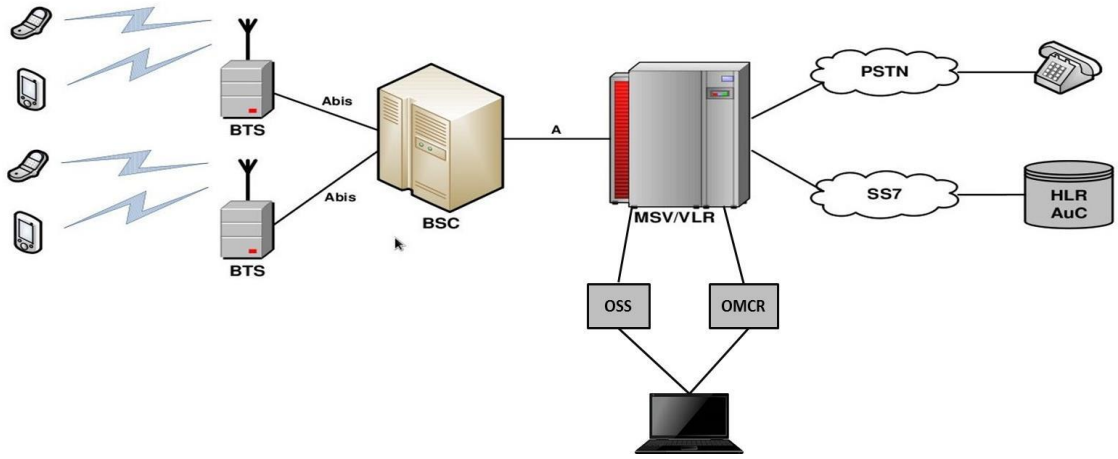
- Services Activation/ provisioning:- Activation done within 4 hours≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

2.4.1.7 AUDIT PARAMETERS –WIRELESS DATA SERVICES (2G & 3G)

Wireless Data Service		
Service Activation	Activation done within 4 hours	≥ 95%
PDP Context activation success rate	PDP Context activation success rate	≥ 95%
Drop Rate	Drop Rate	≤ 5%

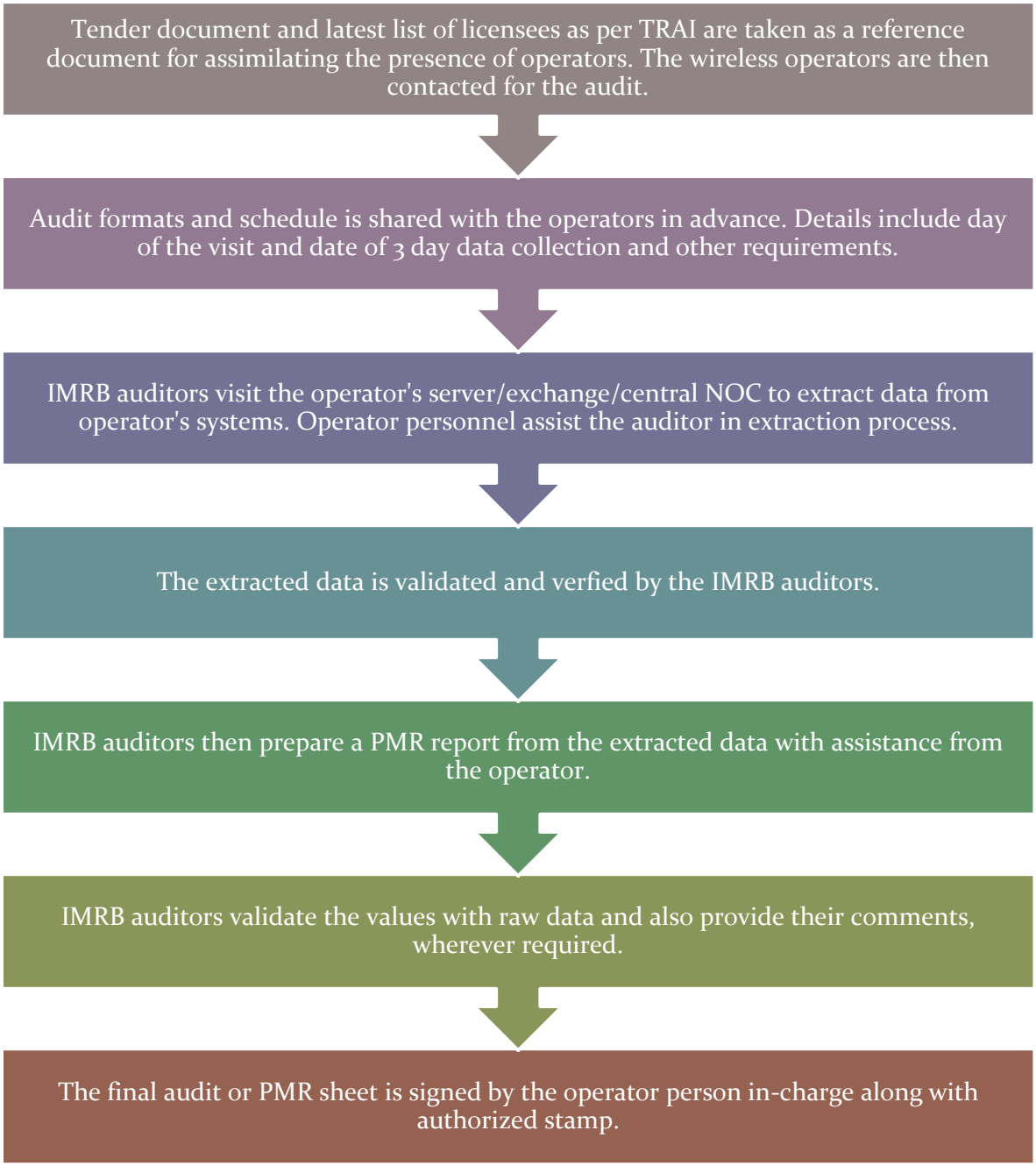
2.4.1.8 POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

The key steps followed for extraction of reports at the operator premises are given below.



Data has been extracted and calculated as per the counter details provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

Parameter	Calculation Methodology
Node Bs Accumulated Downtime	Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100
Worst Affected Node Bs Due to Downtime	(Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node B in Licensed Service Area) * 100
Call Setup Success Rate	(RRC Established / Total RRC Attempts) * 100
RRC Congestion	RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish RRC/ RAB made on day 1 C1 = Average RRC/ RAB Congestion % on day 1 A2 = Number of attempts to establish RRC/ RAB made on day 2 C2 = Average RRC/ RAB Congestion % on day 2 An = Number of attempts to establish RRC/ RAB made on day n Cn = Average RRC/ RAB Congestion % on day n
Circuit Switched RAB Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Circuit Switched Voice Drop Rate	No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released) x 100
Worst Affected Cells having more than 3% Circuit Switched Voice Drop Rate	Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100
Connections with good Circuit switched voice quality	1- (Number of Faulty Transport Blocks In Uplink downlink After Selection Combining Speech / Total number of Transport Blocks In Uplink downlink

	After Selection Combining Speech)) x 100

2.4.1.12 3 DAY LIVE DATA

The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data of 3 days.

The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours.

Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar to PMR report) to assess the various QoS parameters.

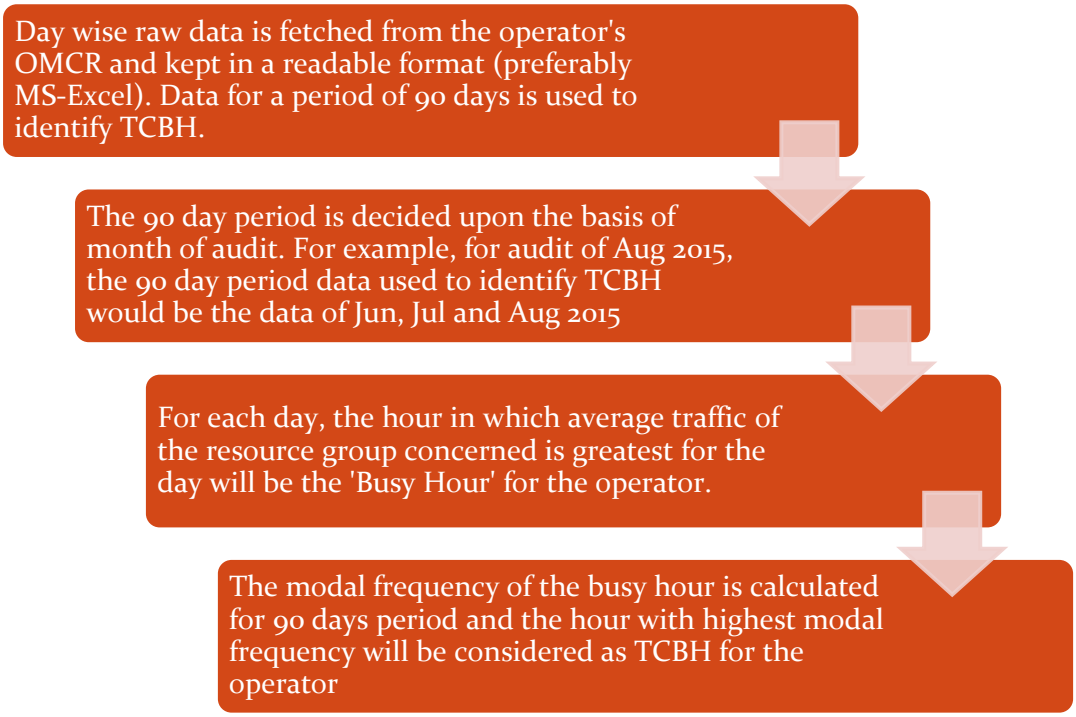
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		January'16	February'16	March'16
1	AIRCEL	8th to 10th Jan'16	1st to 3rd Feb'16	4th to 6th March'16
2	AIRTEL	8th to 10th Jan'16	1st to 3rd Feb'16	4th to 6th March'16
3	BSNL	8th to 10th Jan'16	1st to 3rd Feb'16	8th to 10th March'16
4	IDEA	21st to 23rd Jan'16	8th to 10th Feb'16	8th to 10th March'16
5	RCOM GSM	11th to 13th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
6	Tata GSM	11th to 13th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
7	Telenor	1th to 3rd Jan'16	9th to 11th Feb'16	4th to 6th March'16
8	VODAFONE	4th to 6th Jan'16	8th to 10th Feb'16	28th to 30th March'16
CDMA Operators				
9	RCOM CDMA	11th to 13th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
10	TATA CDMA	11th to 13th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
3G Operators				
11	AIRTEL	29th to 31st Jan'16	1st to 3rd Feb'16	4th to 6th March'16
12	BSNL	29th to 31st Jan'16	1st to 3rd Feb'16	8th to 10th March'16
13	IDEA	21st to 23rd Jan'16	8th to 10th Feb'16	8th to 10th March'16
14	Tata	11th to 13th Jan'16	27th to 29th Feb'16	21st to 23rd March'16
15	VODAFONE	4th to 6th Jan'16	8th to 10th Feb'16	28th to 30th March'16

2.4.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

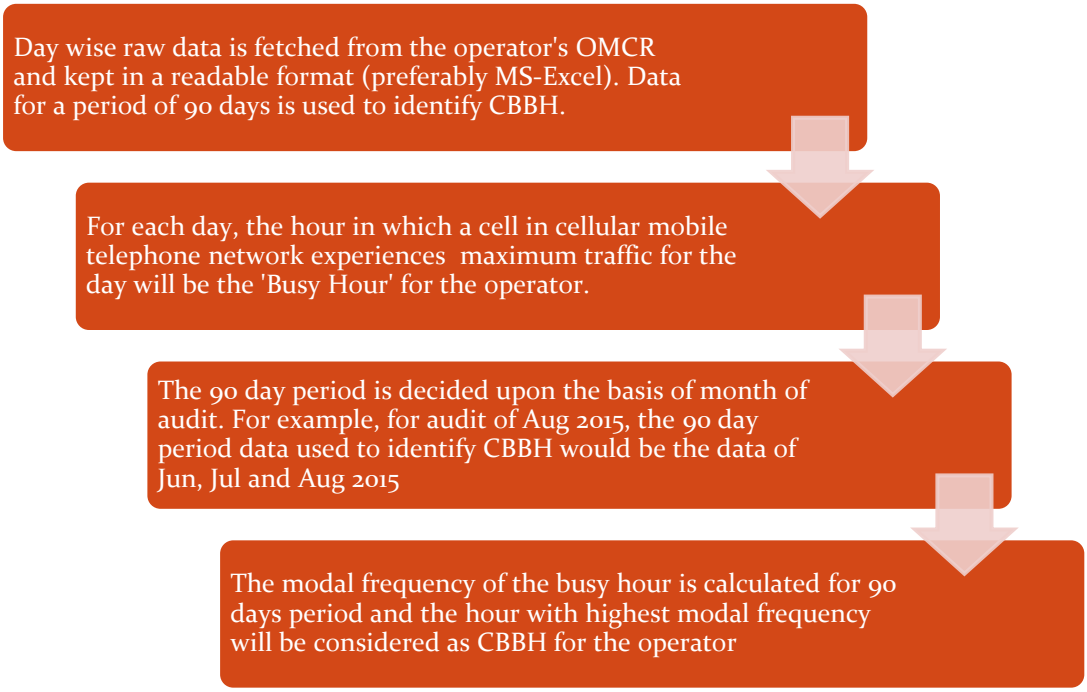
Step by step procedure to identify TCBH for an operator:



2.4.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:



2.4.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March2016 (JFM'16) was collected in the month of January2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (postpaid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter.

All the parameters have been described in detail along with key findings of the parameter in section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks	98%
Resolution of billing/ charging complaints within 6 weeks	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility – Post-paid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – Prepaid	Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Post-paid + Prepaid)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR/ All calls attempted to IVR * 100
Call centre performance (Voice to Voice)	Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100 The calculation excludes the calls dropped before 90 seconds
Time taken for termination/ closure of service	Number of closures done within 7 days/ total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days/ total number of cases of refund after closure * 100

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. Below is a step wise procedure of live calling.

The IMRB auditor visits each operator premises to do live calling. The operators provide the raw data of customer complaints (billing & service) and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls using operator SIM to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center, level 1 services by calling the numbers using operator SIM. The list of call center numbers is provided by the operator. The process followed to test Level 1 services has been stated below.

Using operator SIM, the auditors also make test calls to subscribers of other operators to assess the inter-operator call connectivity in the same licensed service area

Live calling activity was carried out during the period of March2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of February2016 was considered for live calling activity conducted in March 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below.

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th December, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Resolution of billing/ charging complaints - 98% within 4 weeks, 100% within 6 weeks

2.4.2.3 SERVICE COMPLAINTS REQUESTS

"Service request" means a request made to a service provider by its consumer pertaining to his account, and includes.

- A request for change of tariff plan
- A request for activation or deactivation of a value added service or a supplementary service or a special pack
- A request for activation of any service available on the service provider's network
- A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the IMRB auditors.

2.4.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 300 test calls were made per service provider in the quarter.

In JFM'16, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
149	Public Road Transport Utility Service
181	Chief Minister Helpline
182	Indian Railway Security Helpline
1033	Road Accident Management Service
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
1063	Public Grievance Cell DoT Hq
1064	Anti Corruption Helpline
1070	Relief Commission for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Helpline
1077	Control Room for District Collector
1090	Call Alart (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educationa & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline
1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

2.4.2.5 CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center in terms of

- Calls getting connected and answered by operator's IVR.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator in a moving vehicle in a specified network coverage area.
The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test IMRB conducts

the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.
A detailed explanation of the two methodologies has been provided below.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST – VOICE 2G & 3G

SSAs are selected according to the total no. of SSAs on that region and audited as per TRAI instructions; it depends on the total no. of drive on that circle. The drive tests were conducted for all operators in the circle, for both 2G and 3G voice services. As per TRAI instructions, the 2G drive was done in 2G only mode, while 3G drive test was conducted in dual mode (3G on priority).

As per the new directive given by TRAI Office New Delhi, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

1. Normal SSA
2. Difficult SSA

During the drive test in normal SSA, the methodology adopted for the drive test is:

- 3 consecutive days were selected for drive test in selected SSA and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI Office New Delhi.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.

- Height of the antenna was kept uniform in case of all service providers.

In drive test for difficult SSAs, the methodology adopted for the drive test is:-

- Drive test was conducted for 6 consecutive days in selected SSAs and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 500kms in 6 days.

Rest of the activities for drive test in difficult SSAs are same as drive test for normal SSAs.

2.4.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- A minimum of 80 kilometers was traversed during the independent drive test in a SSA on each day. SSA list was finalized by TRAI office New Delhi.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING VOICE DRIVE TEST – 2G & 3G

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- Coverage-Signal strength (GSM)
  - ✓ Total calls made (A)
  - ✓ Number of calls with signal strength between 0 to -75 dBm
  - ✓ Number of calls with signal strength between 0 to -85 dBm
  - ✓ Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
  - ✓ Total Ec/Io BINS (A)
  - ✓ Total Ec/Io BINS with less than –15 (B)
  - ✓ Low Interference = [1 - (B/A)] x 100
- Voice quality (GSM)
  - ✓ Total Rx Qual Samples– A
  - ✓ Rx Qual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 100
- Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

The data drive test is conducted at stationary places called hotspots in a SSA for all the days the voice drive test is conducted in the same SSA.

2.4.4.1 METHODOLOGY

The measurement setup is used to conduct test calls for measuring successful data transmission download and upload attempts, minimum download speed, average throughput and latency is given in figure given below.

The basic measurement set-up consists of a Test-Device and a Test-Server with specified software and hardware. Test calls are established between the Test-Device and Test-Server and measurements are made for the respective QoS parameters. These parameters are measured in a stationary mode. Service Activation/Provisioning, PDP Context Activation Success Rate and Drop rate are reported from the actual network counters/database.

- To assess the quality of the connection between an end user and an Internet Service Provider (ISP), ideally the Test-Server is placed as near as possible to the gateway providing the interconnection between access network and ISP network. The location of the test-server is as near as possible to the gateway providing the interconnection between access network and ISP network implies that the measurements will not reflect the influence in the QoS of the ISP network, between that gateway and the gateway interconnecting with the Internet.

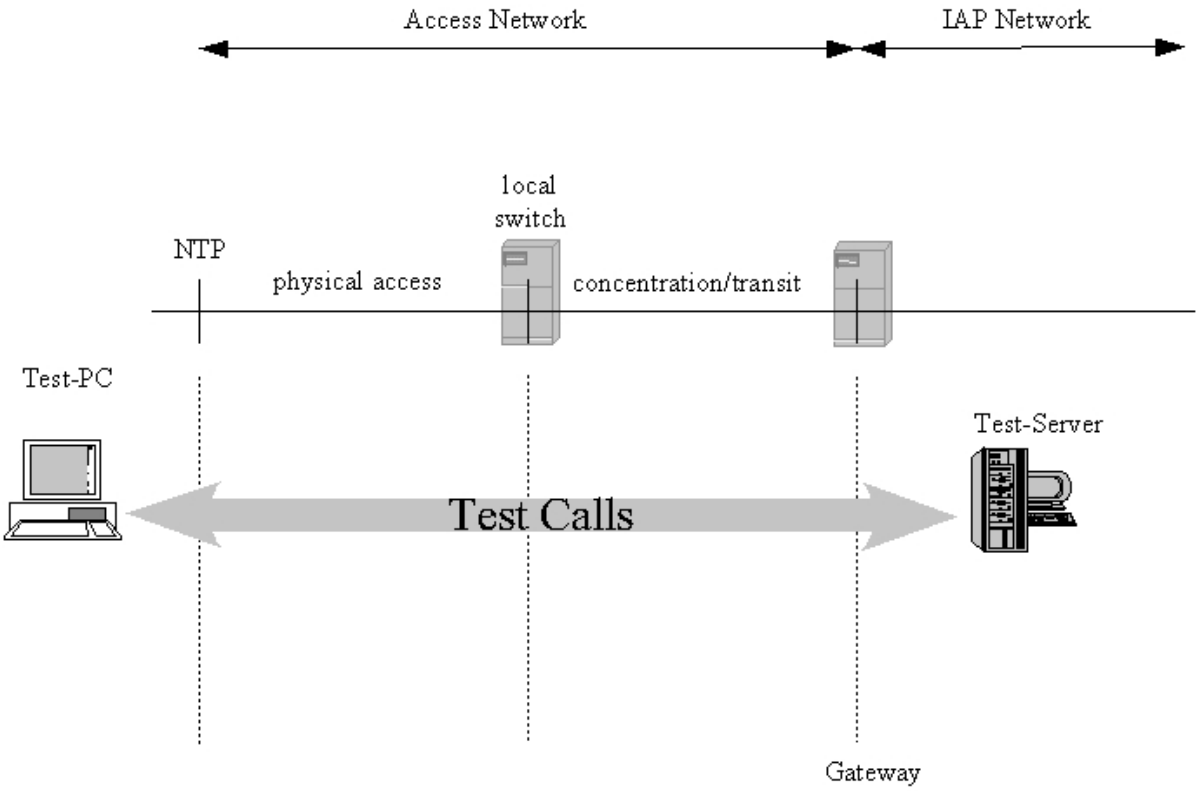


Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

For all tests, a dedicated test server is used as a well-defined reference. The test server may be located centrally for all the licensed service areas (LSA) or for a number of LSAs or in each LSA (not more than one in each LSA). Under no circumstances a commercial server (e.g. www.yahoo.com) is used, since the test conditions for such a server may change over time making later reproduction of the results impossible. The test server is identified by an IP address and not by its fully qualified Domain Name (FQDN) in order to avoid issues with Domain Name Server (DNS) lookup and including the DNS caching strategies of the used operating system into the measurement.

- The Transmission Control Protocol (TCP) settings of the server tested against, is also recorded. Since the number of host operating systems for internet servers is larger than on the client side, no detailed recommendation concerning the TCP settings of the server is given.

However, the TCP stack of the reference server should at least be capable of the following:

- Maximum Segment Size between 1380 Bytes and 1460 Bytes.
- TCP RX Window Size > 4096 Bytes
- SACK (Selective Acknowledgement) enabled.
- TCP Fast Retransmit.
- TCP Fast Recovery enabled.
- Delayed ACK enabled (200ms).

2.4.4.3 TEST FILES

The test file consist of incompressible data i.e. a data file that is already compressed, e.g. like a zip or jpg file. The test file has at least twice the size (in Kbit) of the theoretically maximum data transmission rate per second (in Kbit/s) of the Internet access under consideration.

2.4.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

- The choice of adequate test calls, i.e. geographical locations of origin and destination of calls as well as traffic variations, is a crucial point with respect to the comparability and validation of the statistics are calculated for the measured parameters. For each parameter, it is ensured that the samples are aggregated over all classes of customers for fairness in reflecting the QoS actually perceived by the user and the statistics are preserved to substantiate the same.
- The necessary number of samples (test calls) are 1067 for each of the category "A" and "Metro" licensed service area (LSA), 600 for each of the category "B" LSA and 384 for each of the category "C" LSA for all the parameters.

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

The successful data download attempts is defined as the ratio of successful data downloads to the total number of data download attempts in a specified time period. A data transmission is successful if a test file is downloaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data downloads, divided by the sum total of all attempts to download a test file is provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data download is measured by downloading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission download attempts = $\frac{\text{Total Successful download attempts}}{\text{Total download attempts}} \times 100$

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

The successful data upload attempts is defined as the ratio of successful data uploads to the total number of data upload attempts in a specified time period. A data upload is successful if a test file is uploaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data uploads, divided by the sum total of all attempts to upload a test file should be provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data upload is measured by uploading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission upload attempts = $\frac{\text{Total Successful upload attempts}}{\text{Total upload attempts}} \times 100$

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.

Measurement:

The minimum download speed is calculated from test calls made according to the measurement set-up. Test calls are to be made to weigh the results according to the patterns of real traffic. Minimum download speed is the average of the lower 10% of all such test calls.

Minimum download speed (average of lower 10% of all test calls) = $\frac{\text{Download speed A 1+A2+A3+A4+A5+A6)}}{6} \times 100$

Note- A1, A2, A3, A4 A5 & A6 are download speeds at 6 hotspots

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

It is defined as the rate at which packets are transmitted in a network. In a mobile network the download speed varies depending on the number of users in a particular location. Even though a service provider may be advertising certain speed, the actual speed may vary as per the number of users in the network and there could be customer dissatisfaction on account of relatively slow speed. Hence, there is a need to prescribe an average throughput to protect the interest of consumers. The service providers need to constantly upgrade their network to meet average throughput benchmark.

- The throughput is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.
- The service provider will advertise the throughput being offered to its customers as per their category or plan and it should be meted out as per their commitment.

Measurement:

The average throughput for packet data should be calculated from all the test calls made according to the measurement setup.
Test calls are made to weigh the results according to the patterns of real traffic. Average throughput is calculated as the average of all such test calls.

Average Throughput for Packet data = Average of download attempts in Kbit/ average download time in sec

2.4.4.5.5 LATENCY

Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time period is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as congestion, that may affect the overall time required for transit.

Measurement:

Latency is measured with the test server for ping connected directly to the server on the same Intranet domain.

Latency (Percentage of successful pinged) = $\frac{\text{Total number of successful ping}}{\text{Total number of ping sent to the Test Server}} \times 100$

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel(DWL)	1579627
Airtel	11876030
BSNL	4563162
Idea	20865509
Reliance CDMA	NDR
Reliance GSM	NDR
TATA CDMA	931807
TATA GSM	3073439
Telenor	5998111
Vodafone	NDR
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	NDR
BSNL 3G	668029
Idea 3G	3613248
TATA 3G	1037212
Vodafone 3G	2006725

March'16 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark **Best Performing Operator**

3 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel and Telenor failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.

3 Day Live Measurement (Network Parameters) for 2G

- Telenor failed to meet the benchmark of Worst Affected Cells having more than 3% TCH Drop.

PMR & 3 Day Live Consolidated (Network Parameters) for 3G

- Tata 3G failed to meet the benchmark for Circuit Switched RAB Congestion in PMR audit.
- Tata 3G failed to meet the benchmark for the parameter voice quality in PMR audit
- BSNL 3G failed to meet the benchmark for Node Bs downtime in 3days live audit.
- Idea and Tata 3G failed to meet the benchmark for the parameter voice quality in 3days love audit.

Wireless Data Services for 2G

- Telenor failed to meet the benchmark for Activation done within 4 hours in PMR audit.

Live Calling

- As per the consumers (live calling exercise) Aircel, Airtel, BSNL, Idea, Reliance GSM and TATA GSM & CDMA, and Vodafone failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except Reliance CDMA.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Airtel failed to meet the TRAI benchmark for the parameter.
- Airtel failed to meet the TRAI specified benchmark of calls answered by operators within 90 seconds.

Drive Test (Voice) 2G

Voice Quality

- In Ahmednagar SSA, BSNL, Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor locations.
- In Satara SSA, BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.
- In Solapur SSA, Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor, however BSNL failed in indoor locations for voice quality.
- In Aurangabad SSA, BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

- Jalna SSA, BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

- In Satara SSA, BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor and Reliance CDMA failed in outdoor location.

Call Drop Rate

- In Satara SSA, BSNL failed to meet the benchmark of call drop rate in outdoor location.
- In Solapur SSA, BSNL failed to meet the benchmark of call drop rate.
- In Jalna SSA, BSNL and Reliance GSM failed to meet the benchmark of call drop rate in outdoor locations.

Drive Test (Voice) 3G

Voice Quality

- In Solapur SSA, Vodafone 3G failed to meet the benchmark for Voice quality in indoor locations.

Call Set Success Rate (CSSR)

- In Jalna SSA, BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

- In Ahmednagar BSNL 3G met the benchmark for call drop rate in outdoor locations.
- In Satara SSA, BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.
- In Solapur SSA, BSNL 3G met the benchmark for call drop rate in indoor locations.

4 EXECUTIVE SUMMARY-2G

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the Maharashtra & Goa circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

4.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.05%	0.02%	99.27%	0.13%	0.16%	0.69%	3.04%	95.30%
Airtel	0.02%	0.00%	97.91%	0.11%	0.55%	0.63%	1.69%	97.01%
BSNL	1.86%	1.32%	97.75%	0.54%	1.15%	1.16%	2.83%	96.57%
Idea	0.08%	0.08%	97.83%	0.58%	1.46%	0.61%	2.16%	97.72%
Reliance CDMA	0.10%	0.59%	98.17%	NA	0.83%	0.10%	1.41%	NA
Reliance GSM	0.14%	1.32%	96.79%	0.19%	0.57%	0.11%	0.47%	98.98%
TATA CDMA	0.04%	0.00%	98.50%	NA	0.26%	0.77%	2.22%	99.09%
TATA GSM	0.46%	0.00%	98.70%	0.12%	0.18%	0.36%	1.90%	97.42%
Telenor	0.17%	0.43%	98.12%	0.33%	0.69%	0.84%	3.92%	97.35%
Vodafone	0.12%	0.17%	99.23%	0.39%	0.45%	0.72%	2.73%	97.01%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel and TATA GSM & CDMA.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Aircel.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark for TCH congestion. Aircel performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and Telenor failed to meet the benchmark. Best performance was recorded for Reliance GSM.

Voice Quality

All operators met the benchmark. Best performance was recorded for TATA CDMA.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.1.1 PMR DATA - JANUARYFOR 2G

Month								
Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.06%	0.00%	99.25%	0.11%	0.13%	0.75%	3.68%	95.02%
Airtel	0.03%	0.00%	97.61%	0.09%	0.45%	0.67%	1.53%	97.11%
BSNL	1.89%	1.83%	97.12%	0.49%	1.03%	1.25%	2.84%	96.44%
Idea	0.29%	0.00%	97.33%	0.50%	1.55%	0.63%	2.25%	97.54%
Reliance CDMA	0.06%	0.11%	97.39%	NA	1.18%	0.11%	1.73%	98.90%
Reliance GSM	0.14%	1.21%	96.71%	0.19%	0.49%	0.10%	0.51%	98.85%
TATA CDMA	0.04%	0.00%	98.48%	NA	0.00%	0.82%	2.18%	97.53%
TATA GSM	0.04%	0.00%	0.00%	0.00%	0.00%	NA	NA	97.40%
Telenor	0.15%	0.22%	98.11%	0.35%	0.63%	0.51%	1.55%	97.13%
Vodafone	0.09%	0.23%	99.38%	0.70%	0.62%	0.77%	2.74%	96.89%

4.1.2 PMR DATA –FEBRUARY FOR 2G

Month								
Name of Service Provider Month February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.05%	0.05%	99.25%	0.13%	0.17%	0.68%	2.84%	95.05%
Airtel	0.00%	0.00%	97.59%	0.12%	0.60%	0.66%	1.75%	97.08%
BSNL	1.80%	0.36%	99.78%	0.53%	1.13%	1.10%	2.92%	96.66%
Idea	0.05%	0.05%	98.06%	0.69%	1.48%	0.62%	2.13%	97.64%
Reliance CDMA	0.03%	0.06%	98.51%	NA	1.10%	0.11%	1.93%	98.88%
Reliance GSM	0.16%	1.68%	98.43%	0.16%	0.67%	0.11%	0.53%	98.84%
TATA CDMA	0.03%	0.00%	98.61%	NA	0.23%	0.82%	3.16%	99.02%
TATA GSM	0.61%	0.00%	99.53%	0.13%	0.18%	0.25%	1.89%	97.32%
Telenor	0.16%	0.37%	98.08%	0.34%	0.76%	1.06%	5.20%	97.48%
Vodafone	0.05%	0.18%	99.06%	0.00%	0.00%	0.78%	2.90%	96.50%

4.1.3 PMR DATA - MARCH FOR 2G

Month								
Name of Service Provider Month March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.04%	0.00%	99.30%	0.13%	0.17%	0.65%	2.60%	95.79%
Airtel	0.03%	0.00%	98.53%	0.11%	0.60%	0.63%	1.79%	96.92%
BSNL	1.90%	1.78%	96.35%	0.59%	1.28%	1.13%	2.73%	96.63%
Idea	0.06%	0.12%	98.09%	0.56%	1.36%	0.60%	2.12%	97.96%
Reliance CDMA	0.22%	1.61%	98.61%	NA	0.20%	0.10%	0.55%	99.48%
Reliance GSM	0.13%	1.06%	95.21%	0.23%	0.56%	0.11%	0.38%	99.25%
TATA CDMA	0.05%	0.00%	98.41%	NA	0.56%	0.67%	2.52%	99.90%
TATA GSM	0.72%	0.00%	97.87%	0.12%	0.17%	0.46%	1.91%	97.50%
Telenor	0.20%	0.71%	98.17%	0.29%	0.67%	1.00%	5.02%	97.47%
Vodafone	0.40%	0.00%	99.26%	0.48%	0.74%	0.75%	3.39%	97.03%

4.2 3 DAY DATA – CONSOLIDATED FOR 2G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.08%	0.00%	99.59%	0.12%	0.04%	0.54%	2.74%	95.87%
Airtel	0.02%	0.00%	97.85%	0.11%	0.71%	0.65%	1.70%	97.13%
BSNL	1.83%	0.11%	96.59%	0.46%	1.19%	1.12%	2.85%	96.92%
Idea	0.09%	0.00%	97.70%	0.67%	1.58%	0.63%	2.23%	97.61%
Reliance CDMA	0.10%	0.02%	98.72%	NA	0.69%	0.12%	1.31%	NA
Reliance GSM	0.19%	0.00%	97.04%	0.20%	0.54%	0.08%	0.37%	98.98%
TATA CDMA	0.02%	0.00%	98.59%	NA	0.21%	1.07%	1.33%	98.69%
TATA GSM	0.40%	0.00%	98.40%	0.15%	0.16%	0.43%	1.89%	97.42%
Telenor	0.18%	0.00%	98.13%	0.55%	0.77%	0.88%	4.19%	97.26%
Vodafone	0.12%	0.00%	99.32%	0.42%	0.55%	0.72%	2.74%	97.07%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel and TATA CDMA.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark for worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Aircel.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Airtel recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark for TCH congestion. Aircel performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM.

Worst Affected Cells Having More than 3% TCH Drop:

Telenor failed to meet the benchmark. Best performance was recorded for Reliance GSM.

Voice Quality

All operators met the benchmark. Best performance was recorded for Reliance GSM.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.2.1 3 DAY DATA - JANUARYFOR 2G

3 Day								
Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.09%	0.00%	99.57%	0.15%	0.04%	0.56%	2.95%	95.34%
Airtel	0.02%	0.00%	97.56%	0.11%	0.69%	0.65%	1.67%	97.19%
BSNL	1.79%	0.12%	96.62%	0.44%	1.16%	1.13%	2.88%	96.72%
Idea	0.03%	0.00%	98.20%	0.55%	1.60%	0.70%	2.30%	97.54%
Reliance CDMA	0.02%	0.00%	98.67%	NA	0.77%	0.16%	2.18%	98.90%
Reliance GSM	0.15%	0.00%	95.85%	0.22%	0.55%	0.11%	0.59%	98.83%
TATA CDMA	0.00%	0.00%	98.59%	NA	0.00%	1.66%	1.16%	98.20%
TATA GSM	0.00%	0.00%	NA	0.00%	0.00%	NA	NA	97.40%
Telenor	0.17%	0.00%	98.12%	0.99%	0.85%	0.55%	1.42%	96.80%
Vodafone	0.01%	0.00%	99.38%	0.70%	0.62%	0.78%	2.63%	97.50%

4.2.2 3 DAY DATA –FEBRUARY FOR 2G

3 Day								
Name of Service Provider 3 Day February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.09%	0.00%	99.57%	0.15%	0.04%	0.56%	2.95%	95.34%
Airtel	0.03%	0.00%	97.52%	0.11%	0.64%	0.65%	1.68%	97.15%
BSNL	1.79%	0.12%	96.62%	0.44%	1.16%	1.13%	2.88%	96.72%
Idea	0.09%	0.00%	97.86%	0.79%	1.68%	0.69%	2.69%	97.70%
Reliance CDMA	0.03%	0.06%	98.83%	#DIV/0!	1.14%	0.10%	1.24%	98.90%
Reliance GSM	0.13%	0.00%	97.82%	0.17%	0.71%	0.10%	0.42%	98.84%
TATA CDMA	0.00%	0.00%	98.67%	#DIV/0!	0.04%	0.72%	2.95%	96.17%
TATA GSM	0.40%	0.00%	99.57%	0.14%	0.10%	0.43%	2.00%	97.37%
Telenor	0.16%	0.00%	97.89%	0.27%	0.80%	1.06%	5.25%	97.44%
Vodafone	0.11%	0.01%	99.10%	0.26%	0.51%	0.72%	2.73%	96.99%

4.2.3 3 DAY DATA - MARCH FOR 2G

3 Day								
Name of Service Provider 3 Day March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	0.05%	0.00%	99.62%	0.06%	0.04%	0.51%	2.31%	96.91%
Airtel	0.03%	0.00%	98.46%	0.13%	0.79%	0.64%	1.75%	96.98%
BSNL	1.90%	0.10%	96.54%	0.50%	1.26%	1.12%	2.79%	97.33%
Idea	0.05%	0.00%	97.05%	0.68%	1.47%	0.52%	1.76%	98.26%
Reliance CDMA	0.24%	0.00%	98.67%	NA	0.16%	0.10%	0.52%	98.26%
Reliance GSM	0.28%	0.00%	97.44%	0.20%	0.36%	0.03%	0.10%	99.29%
TATA CDMA	0.02%	0.00%	98.49%	NA	0.59%	0.62%	2.14%	99.86%
TATA GSM	0.74%	0.00%	97.22%	0.15%	0.22%	0.43%	1.77%	97.62%
Telenor	0.22%	0.00%	98.38%	0.38%	0.66%	1.04%	5.92%	97.50%
Vodafone	0.30%	0.00%	99.49%	0.30%	0.51%	0.69%	3.12%	97.16%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

PMR - 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.84%	1.58%	95.67%	0.85%	1.36%	1.42%	2.52%	NA
Idea 3G	0.08%	0.03%	99.64%	0.31%	0.09%	1.22%	1.82%	98.62%
TATA 3G	0.00%	0.00%	98.76%	0.78%	2.71%	0.36%	2.80%	89.39%
Vodafone 3G	0.16%	0.37%	99.74%	0.23%	0.08%	0.22%	1.62%	98.91%

NDR: No Data received

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for TATA 3G.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for TATA 3G.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea 3G.

RRC Congestion:

All operators met the benchmark for RRC Congestion. The maximum RRC Congestion was observed for Idea.

Circuit Switched RAB Congestion:

Tata 3G failed to meet the benchmark for Circuit Switched RAB Congestion. The maximum Circuit Switched RAB Congestion was observed for Idea.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Tata 3G.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Minimum Worst affected cells having more than 3% Circuit switched voice drop rate was recorded for Idea.

Circuit Switch Voice Quality:

Tata 3G failed to meet the benchmark for the parameter. Best performance was recorded for Vodafone 3G.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.3.1 PMR DATA - JANUARYFOR 3G

Month								
Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.90%	1.75%	95.58%	0.81%	1.57%	1.52%	2.84%	NDR
Idea 3G	0.29%	0.00%	99.63%	0.30%	0.06%	1.47%	2.10%	98.69%
TATA 3G	0.00%	0.00%	98.75%	0.75%	0.99%	0.55%	2.87%	87.08%
Vodafone 3G	0.17%	0.15%	99.72%	0.21%	0.08%	0.28%	2.87%	98.91%

4.3.2 PMR DATA –FEBRUARY FOR 3G

Month								
Name of Service Provider Month February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.80%	1.45%	95.53%	0.88%	1.39%	1.39%	2.53%	NDR
Idea 3G	0.04%	0.03%	99.67%	0.30%	0.10%	0.23%	1.31%	98.62%
TATA 3G	0.00%	0.00%	98.76%	0.71%	1.00%	0.50%	2.89%	99.68%
Vodafone 3G	0.17%	0.48%	99.70%	0.34%	0.12%	0.24%	1.73%	98.91%

4.3.3 PMR DATA - MARCH FOR 3G

Month								
Name of Service Provider Month March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.83%	1.55%	95.91%	0.88%	1.11%	1.35%	2.20%	NDR
Idea 3G	0.05%	0.04%	99.64%	0.32%	0.12%	0.34%	2.09%	98.62%
TATA 3G	0.00%	0.00%	98.76%	0.89%	6.13%	0.10%	2.62%	99.70%
Vodafone 3G	0.15%	0.47%	99.80%	0.12%	0.04%	0.20%	1.38%	98.91%

4.4 3 DAY DATA – CONSOLIDATED FOR 3G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Live Data - 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	7.67%	0.62%	95.58%	0.88%	1.51%	1.47%	2.87%	NA
Idea 3G	0.11%	0.00%	99.64%	0.29%	0.10%	1.42%	1.61%	90.40%
TATA 3G	0.00%	0.00%	95.10%	0.46%	0.59%	0.46%	2.69%	86.31%
Vodafone 3G	1.61%	0.20%	98.57%	0.33%	0.19%	0.12%	1.40%	97.91%

NDR: No Data Received

Node Bs downtime:

BSNL 3G failed to meet the benchmark. Minimum Node Bs downtime was recorded for Tata 3G.

Worst affected Node Bs due to downtime:

All operators met the benchmark. Minimum worst affected Node Bs due to downtime was recorded for Idea and Tata 3G,

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea 3G.

RRC Congestion:

All operators met the benchmark for RRC Congestion. The maximum RRC Congestion was observed for Idea 3G.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. The maximum Circuit Switched RAB Congestion was observed for Idea.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Tata 3G.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Minimum Worst affected cells having more than 3% Circuit switched voice drop rate was recorded for Idea 3G.

Circuit Switch Voice Quality:

Idea and Tata 3G failed to meet the benchmark for the parameter.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.4.1 3 DAY DATA - JANUARYFOR 3G

3 Day								
Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.90%	1.75%	95.58%	0.81%	1.57%	1.52%	2.84%	NDR
Idea 3G	0.03%	0.00%	99.65%	0.40%	0.08%	1.46%	2.15%	99.10%
TATA 3G	0.00%	0.00%	98.77%	0.75%	0.98%	0.60%	2.90%	87.08%
Vodafone 3G	0.17%	0.14%	98.56%	0.11%	0.00%	1.03%	2.90%	99.03%

4.4.2 3 DAY DATA –FEBRUARY FOR 3G

3 Day								
Name of Service Provider 3 Day February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.82%	0.04%	95.32%	0.86%	1.75%	1.30%	2.90%	NDR
Idea 3G	0.09%	0.00%	99.60%	0.25%	0.11%	0.22%	1.04%	98.62%
TATA 3G	0.01%	0.00%	87.06%	0.40%	0.79%	0.45%	2.71%	99.69%
Vodafone 3G	1.51%	0.00%	98.60%	0.79%	0.56%	0.88%	1.62%	98.00%

4.4.3 3 DAY DATA - MARCH FOR 3G

3 Day								
Name of Service Provider 3 Day March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	1.62%	0.07%	95.85%	0.96%	1.22%	1.20%	2.87%	NDR
Idea 3G	0.08%	0.00%	99.67%	0.22%	0.10%	0.30%	1.75%	98.61%
TATA 3G	0.01%	0.00%	99.47%	0.23%	0.00%	0.09%	2.45%	99.72%
Vodafone 3G	1.55%	0.47%	98.54%	0.09%	0.00%	0.06%	0.87%	96.90%

4.5 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel(DWL)	100.00%	97.34%	0.77%	NA	96.25%	0.79%
Airtel	NA	NA	NA	NA	NA	NA
BSNL	NA	97.95%	2.87%	NA	97.53%	2.88%
Idea	NA	NA	NA	NA	NA	NA
Reliance CDMA	NA	NA	NA	NA	NA	NA
Reliance GSM	NA	NA	NA	NA	NA	NA
TATA CDMA	NA	NA	NA	NA	NA	NA
TATA GSM	NA	NA	NA	NA	NA	NA
Telenor	94.88%	97.15%	0.84%	97.50%	99.53%	0.71%
Vodafone	NA	NA	4.72%	NA	NA	NA

NA- No data received

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Activation done within 4 hours:

Telenor failed to meet the benchmark for Activation done within 4 hours in PMR audit.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate.

Drop Rate:

All operators met the benchmark for Drop Rate.

4.6 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	NDR	97.95%	2.46%	NDR	97.53%	2.56%
Idea 3G	NA	NA	NA	NDR	NA	NA
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	NDR	NDR	NDR	NDR	NDR	NDR

Note: NDR (No Data Received)

Following are the parameter wise observations for wireless operators for Maharashtra & Goa circle:

Activation done within 4 hours:

No data received from operators for Activation done within 4 hours in PMR audit as well as live.

PDP Context activation success rate:

All operators met the benchmark PDP Context activation success rate in PMR audit as well as live.

Drop Rate:

All operators met the benchmark for Drop Rate in PMR audit as well as live.

4.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel(DWL)	91.00%	100.00%	100.00%	100.00%	43.67%	≥ 95%
Airtel	80.00%	100.00%	100.00%	100.00%	63.00%	92.00%
BSNL	92.00%	100.00%	100.00%	100.00%	63.00%	94.12%
Idea	91.11%	100.00%	100.00%	100.00%	63.00%	93.75%
Reliance CDMA	98.67%	100.00%	100.00%	100.00%	100.00%	93.68%
Reliance GSM	96.10%	100.00%	100.00%	100.00%	91.67%	88.37%
TATA CDMA	90.00%	100.00%	100.00%	100.00%	80.00%	100.00%
TATA GSM	95.00%	100.00%	100.00%	100.00%	72.33%	90.91%
Telenor	NA	NA	100.00%	100.00%	84.33%	97.56%
Vodafone	93.22%	100.00%	100.00%	100.00%	83.67%	100.00%

Resolution of billing complaints

As per the consumers (live calling exercise) Aircel, Airtel, BSNL, Idea, Reliance GSM and TATA GSM & CDMA, and Vodafone failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95% with most of the operators recording 100% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

All operators met the benchmark for the parameter.

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except Reliance CDMA.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Tata CDMA and Vodafone recorded the best performance at 100%.

4.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.00%	0.00%	100.00%	100.00%	100.00%	98.17%	96.55%
Airtel	0.13%	0.02%	100.00%	100.00%	100.00%	100.00%	90.23%
BSNL	0.00%	0.01%	100.00%	100.00%	100.00%	100.00%	98.33%
Idea	0.06%	0.07%	100.00%	100.00%	100.00%	98.48%	99.67%
Reliance CDMA	0.08%	0.01%	100.00%	100.00%	100.00%	99.42%	95.61%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	99.67%	96.45%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	99.15%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	95.27%	95.19%
Telenor	NA	NA	100.00%	100.00%	100.00%	99.59%	99.49%
Vodafone	NA	NA	100.00%	100.00%	100.00%	99.59%	99.49%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Airtel failed to meet the TRAI benchmark for the parameter. Aircel had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers all operators met the benchmark of charging disputes. Airtel performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and within 6 weeks.

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark for IVR call being attended. BSNL and Airtel recorded the best performance for the parameter.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Airtel failed to meet the TRAI specified benchmark of 95%. Telenor recorded the best performance for the parameter.

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Aircel(DWL)	NA	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	99.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	99.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	98.00%	100.00%	100.00%	NA	100.00%	97.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.00%	NA	100.00%	100.00%
Telenor	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	NA	100.00%
Vodafone	100.00%	96.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	NA

Maximum Problem faced by the calling operator to other operator. The orange colour denotes performance below circle average.

In the inter-operator call assessment, most of the operators did not face any problems in connecting to other operators.

4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.05%	0.05%	0.02%	0.02%	99.27%	99.27%	0.12%	0.13%	0.16%	0.16%	0.69%	0.69%	3.04%	3.04%	95.29%	95.30%	0.00%	0.00%
Airtel	0.03%	0.02%	0.00%	0.00%	98.12%	97.91%	0.11%	0.11%	0.63%	0.55%	0.65%	0.63%	1.71%	1.69%	97.08%	97.01%	0.00%	0.00%
BSNL	1.91%	1.86%	1.78%	1.32%	96.71%	97.75%	0.54%	0.54%	1.15%	1.15%	1.16%	1.16%	2.83%	2.83%	96.58%	96.57%	0.00%	0.00%
Idea	0.06%	0.08%	0.11%	0.08%	97.83%	97.83%	0.58%	0.58%	1.46%	1.46%	0.62%	0.61%	2.16%	2.16%	97.71%	97.72%	0.00%	0.00%
RCOM CDMA	0.11%	0.10%	0.59%	0.59%	98.17%	98.17%	0.00%	NA	0.83%	0.83%	0.10%	0.10%	1.34%	1.41%	99.07%	NA	0.00%	0.00%
RCOM GSM	0.15%	0.14%	1.32%	1.32%	96.92%	96.79%	0.20%	0.19%	0.58%	0.57%	0.11%	0.11%	0.47%	0.47%	98.98%	98.98%	0.00%	0.00%
TATA CDMA	0.04%	0.04%	0.00%	0.00%	98.50%	98.50%	0.00%	NA	0.39%	0.26%	0.79%	0.77%	2.62%	2.22%	99.60%	99.09%	0.00%	0.00%
TATA GSM	0.02%	0.46%	0.00%	0.00%	98.91%	98.70%	0.11%	0.12%	0.17%	0.18%	0.42%	0.36%	2.60%	1.90%	97.29%	97.42%	0.00%	0.00%
Telenor	0.17%	0.17%	0.43%	0.43%	98.14%	98.12%	0.32%	0.33%	0.68%	0.69%	0.86%	0.84%	4.12%	3.92%	97.42%	97.35%	0.00%	0.00%
Vodafone	0.12%	0.12%	0.31%	0.17%	99.36%	99.23%	0.51%	0.39%	0.64%	0.45%	0.75%	0.72%	2.71%	2.73%	96.96%	97.01%	0.00%	0.00%

4.11 PMR COMPARISON WITH IMRB AND OPERATORS DATA 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
BSNL 3G	1.87%	1.84%	1.53%	1.58%	96.00%	95.67%	0.80%	0.85%	1.30%	1.36%	1.40%	1.42%	2.50%	2.52%	96.53%	NA	0.00%	0.00%
Idea 3G	0.05%	0.08%	0.04%	0.03%	99.64%	99.64%	0.29%	0.31%	0.11%	0.09%	0.28%	1.22%	1.82%	1.82%	98.62%	98.62%	0.00%	0.00%
TATA 3G	0.06%	0.00%	0.00%	0.00%	97.38%	98.76%	0.99%	0.78%	0.75%	2.71%	0.49%	0.36%	2.89%	2.80%	99.92%	89.39%	0.00%	0.00%
Vodafone 3G	0.17%	0.16%	0.37%	0.37%	99.74%	99.74%	0.22%	0.23%	0.08%	0.08%	0.24%	0.22%	1.62%	1.62%	98.91%	98.91%	0.00%	0.00%

5 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel and Telenor failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop.

3 Day Live Measurement (Network Parameters) for 2G

- Telenor failed to meet the benchmark of Worst Affected Cells having more than 3% TCH Drop.

PMR & 3 Day Live Consolidated (Network Parameters) for 3G

- Tata 3G failed to meet the benchmark for Circuit Switched RAB Congestion in PMR audit.
- Tata 3G failed to meet the benchmark for the parameter voice quality in PMR audit
- BSNL 3G failed to meet the benchmark for Node Bs downtime in 3days live audit.
- Idea and Tata 3G failed to meet the benchmark for the parameter voice quality in 3days love audit.

Wireless Data Services for 2G

- Telenor failed to meet the benchmark for Activation done within 4 hours in PMR audit.

Live Calling

- As per the consumers (live calling exercise) Aircel, Airtel, BSNL, Idea, Reliance GSM and TATA GSM & CDMA, and Vodafone failed to meet the benchmark of resolving 98% complaints within 4 weeks however all operators met the benchmark of 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except Reliance CDMA.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Airtel failed to meet the TRAI benchmark for the parameter.
- Airtel failed to meet the TRAI specified benchmark of calls answered by operators within 90 seconds.

Drive Test (Voice) 2G

Voice Quality

- In Ahmednagar SSA, BSNL, Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor locations.
- In Satara SSA, BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.
- In Solapur SSA, Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor, however BSNL failed in indoor locations for voice quality.
- In Aurangabad SSA, BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

- Jalna SSA, BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

- In Satara SSA, BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor and Reliance CDMA failed in outdoor location.

Call Drop Rate

- In Satara SSA, BSNL failed to meet the benchmark of call drop rate in outdoor location.
- In Solapur SSA, BSNL failed to meet the benchmark of call drop rate.
- In Jalna SSA, BSNL and Reliance GSM failed to meet the benchmark of call drop rate in outdoor locations.

Drive Test (Voice) 3G

Voice Quality

- In Solapur SSA, Vodafone 3G failed to meet the benchmark for Voice quality in indoor locations.

Call Set Success Rate (CSSR)

- In Jalna SSA, BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

- In Ahmednagar BSNL 3G met the benchmark for call drop rate in outdoor locations.
- In Satara SSA, BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.
- In Solapur SSA, BSNL 3G met the benchmark for call drop rate in indoor locations.

6 PARAMETER DESCRIPTION& DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 2G

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 PARAMETER DESCRIPTION

➲ The parameter of network availability would be measured from following sub-parameters

1. BTSs Accumulated downtime (not available for service)
2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology –**
BTS accumulated downtime (not available for service) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100

3. **TRAI Benchmark –**

   a. BTSs Accumulated downtime (not available for service) ≤ 2%

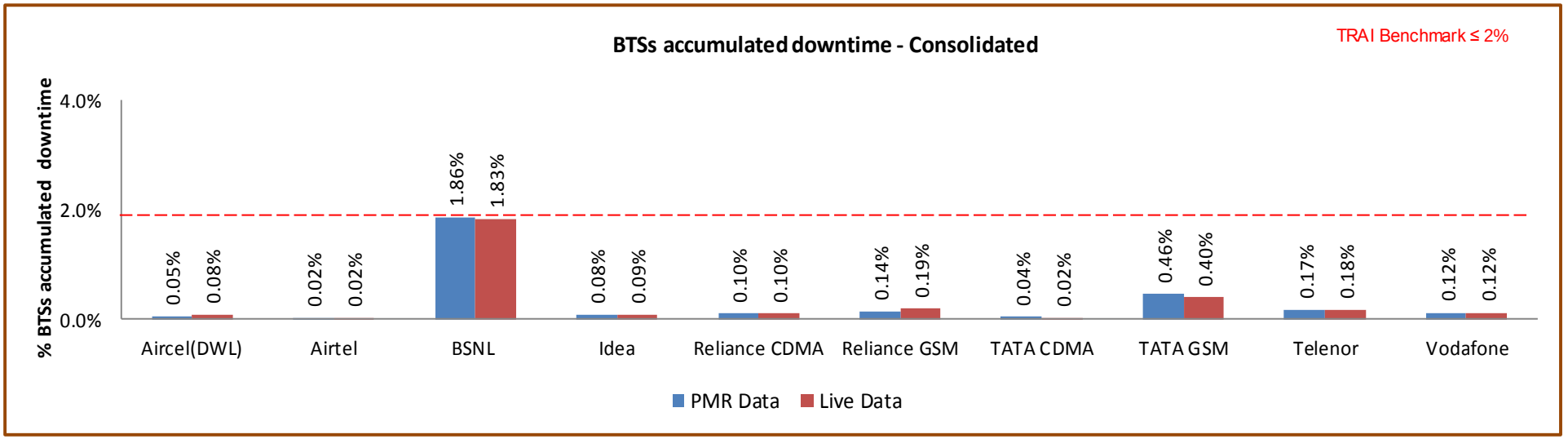
4. **Audit Procedure –**

   ➲ The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

   ➲ All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
- When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

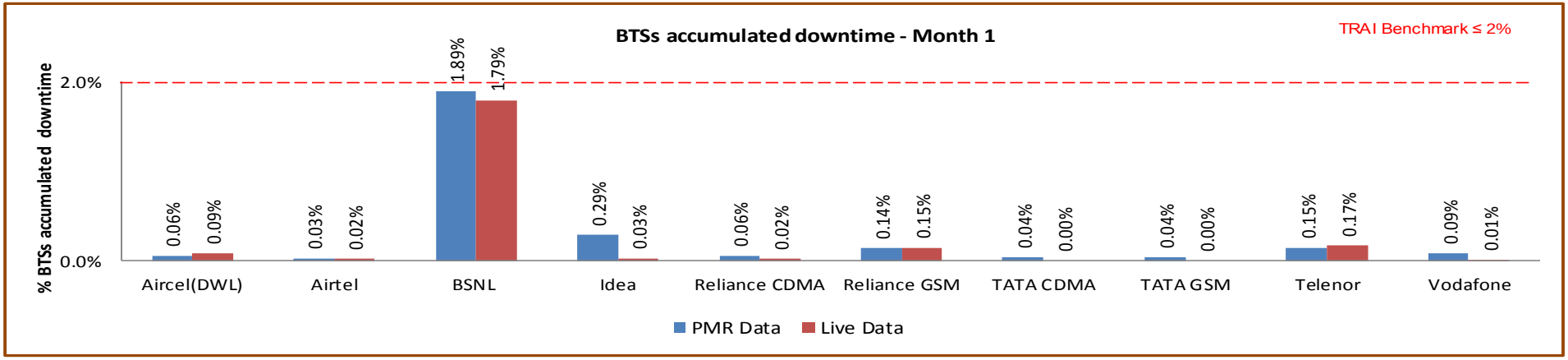
6.1.2 KEY FINDINGS - CONSOLIDATED



Data Source: Operations and Maintenance Center (OMC) of the operators

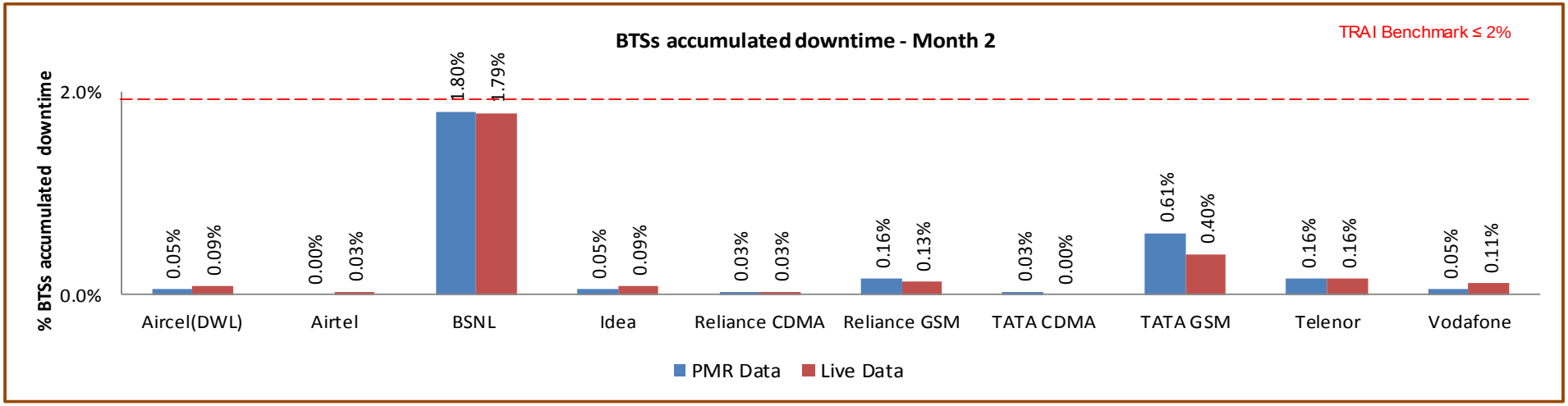
All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



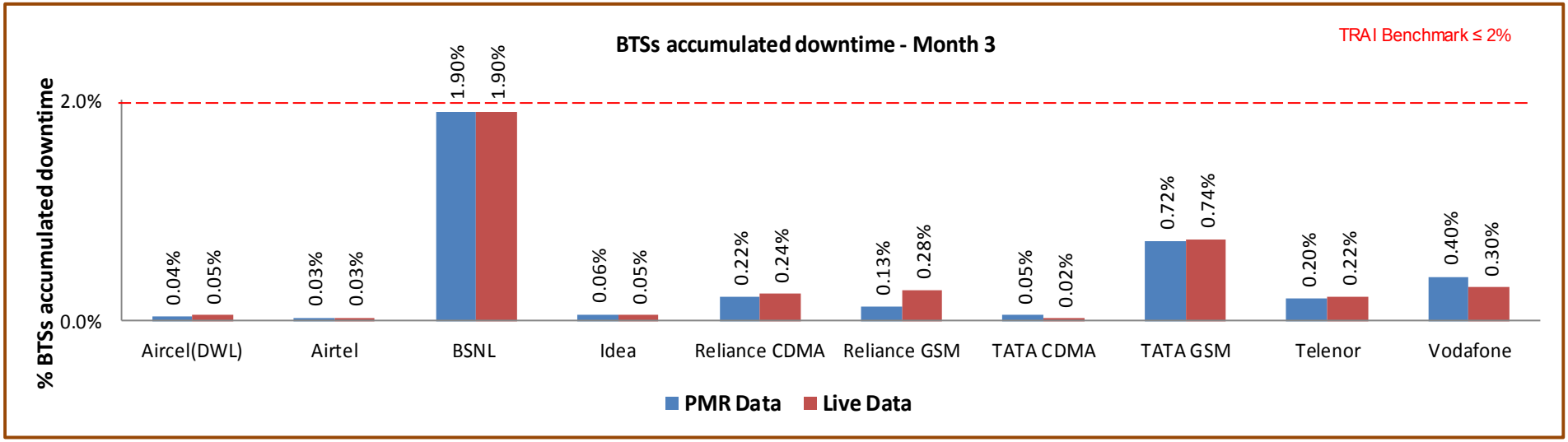
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

6.2 WORST AFFECTED BTS DUE TO DOWNTIME

6.2.1 PARAMETER DESCRIPTION

- **Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

  For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology –**

  Worst affected BTSs due to downtime = (Number of BTSs having accumulated downtime greater than 24 hours in a month /Number of BTS in Licensed Service Area) * 100

- **TRAI Benchmark –**

  a. Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure –**

  i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

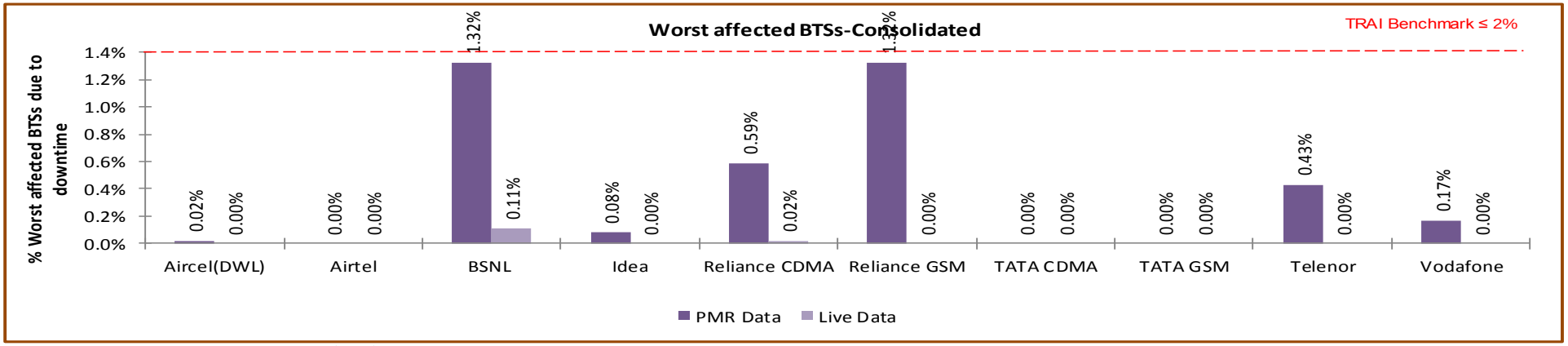
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv. Any outage as a result of force majeure was not considered at the time of calculation.

  v. List of operating sites with cell details and ids are taken from the operator.

  vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

6.2.2 KEY FINDINGS– CONSOLIDATED

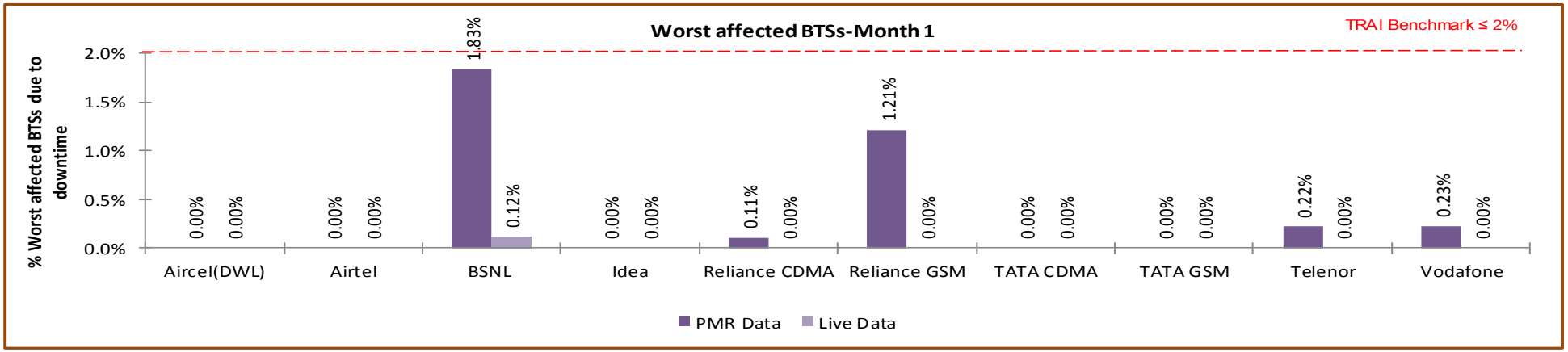


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

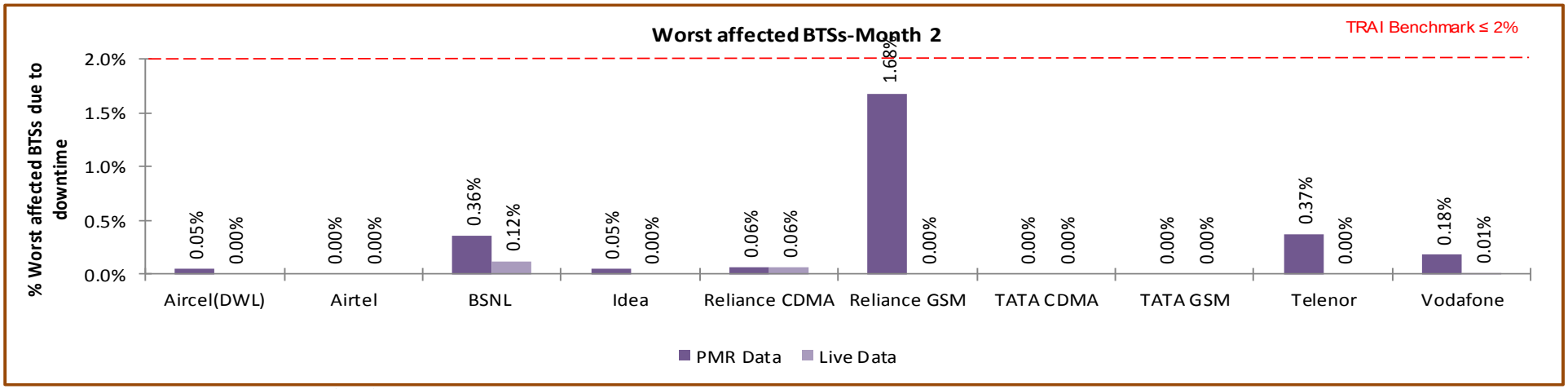
Significant difference was observed between PMR & live measurement data for BSNL Telenor, reliance GSM and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



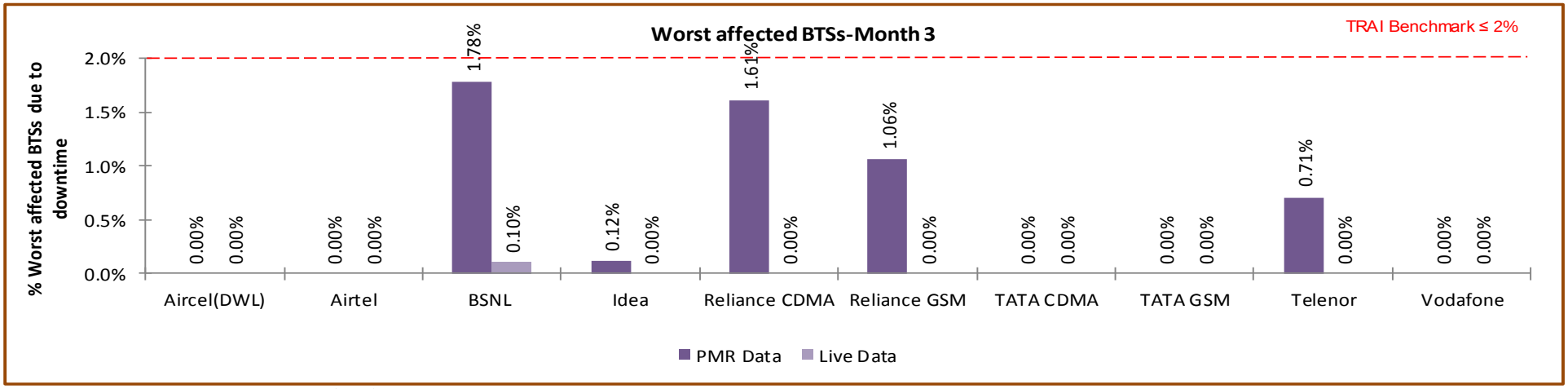
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

1. **Definition:** The ratio of successful calls established to total calls is known as Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

   (Calls Established / Total Call Attempts) * 100

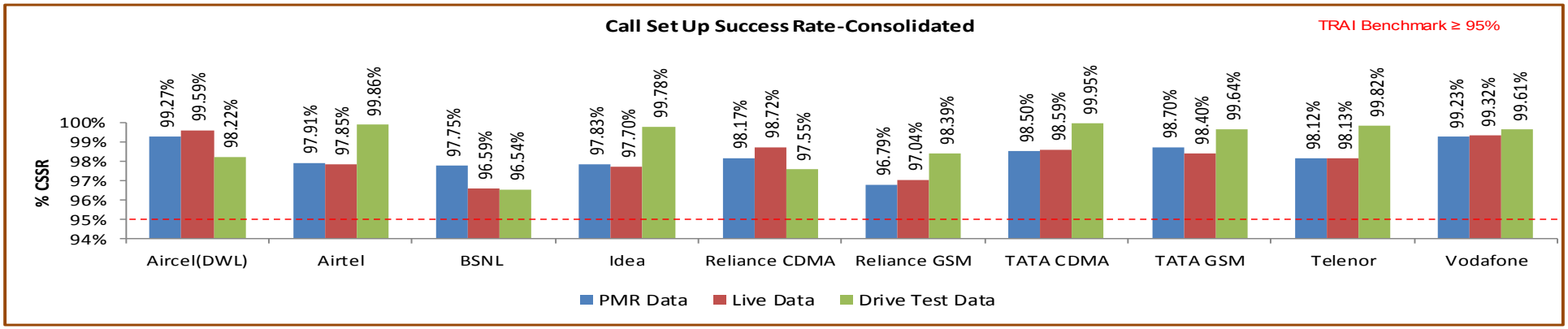
   Call Established means the following events have happened in call setup:-

   - call attempt is made
   - the TCH is allocated
   - the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark≥** 95%
4. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
   - Counter data is extracted from the NOC of the operators.
   - Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.
   - The numerator and denominator values are derived from adding the counter values from the MSC.

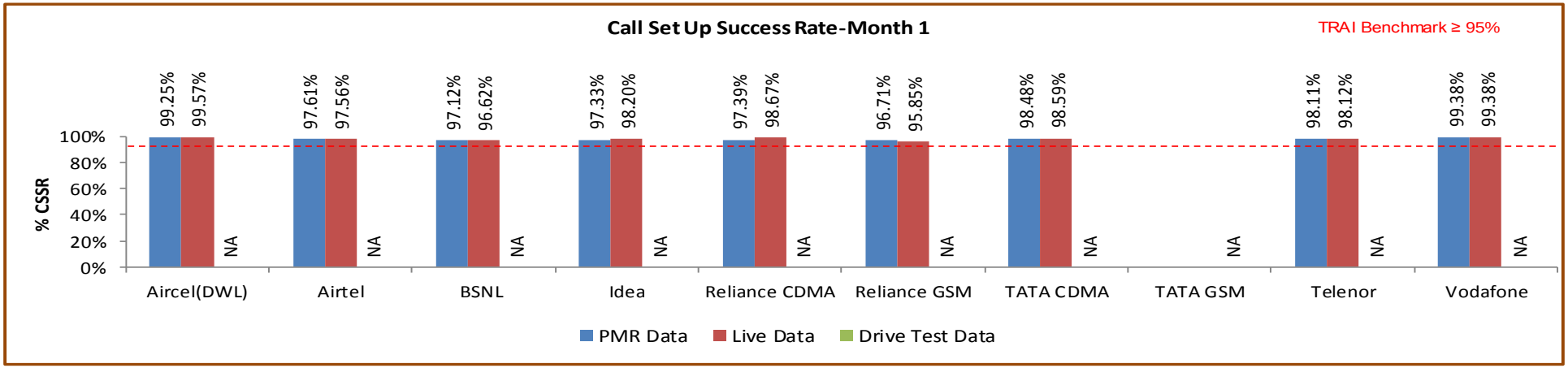
6.3.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

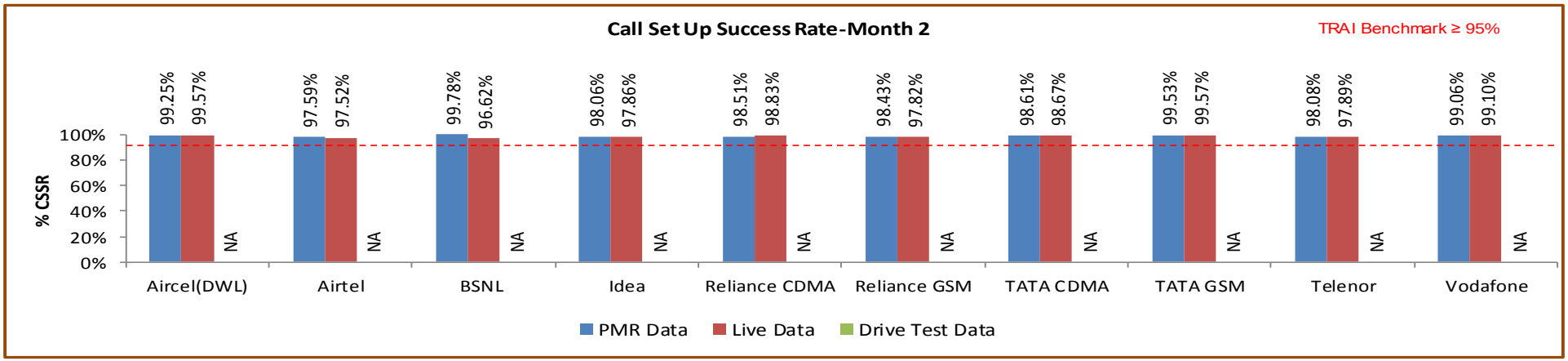
All operators met the TRAI benchmark as per audit/PMR, 3days live as well as drive test

6.3.2.1 KEY FINDINGS – MONTH 1



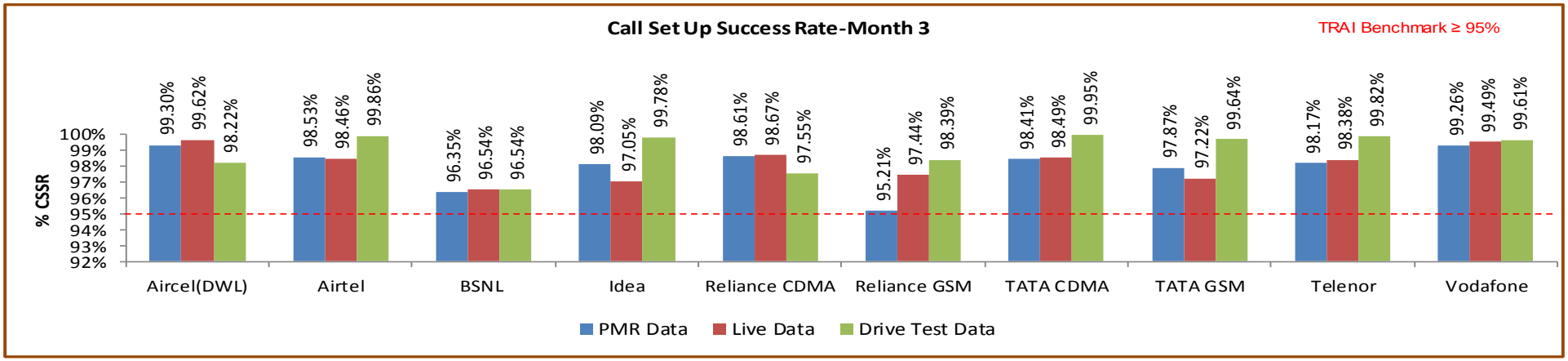
Data Source: Network Operations Center(NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

6.3.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

6.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

6.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect

2. **Computational Methodology:**

   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2

- An = POI traffic offered on all POIs (no. of calls) on day n
- Cn = Average POI Congestion % on day n

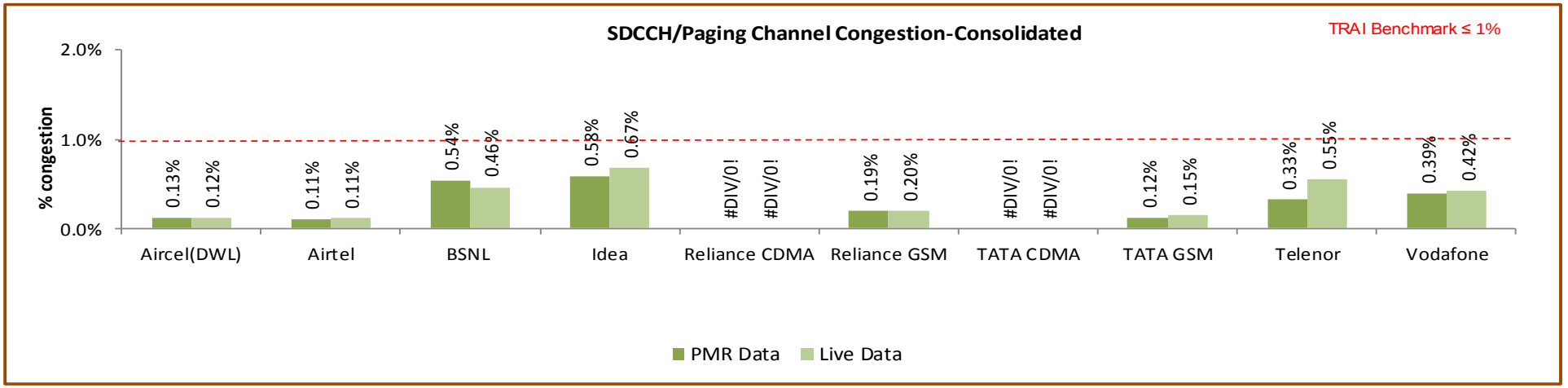
3. **Benchmark:**

   - SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

4. **Audit Procedure –**

   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

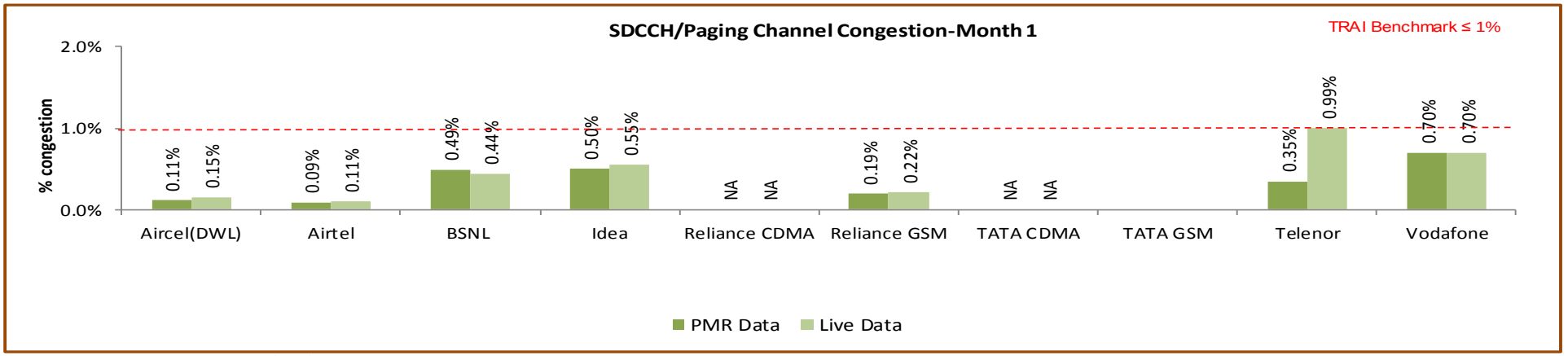
6.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



Data Source: Network Operations Center(NOC) of the operators

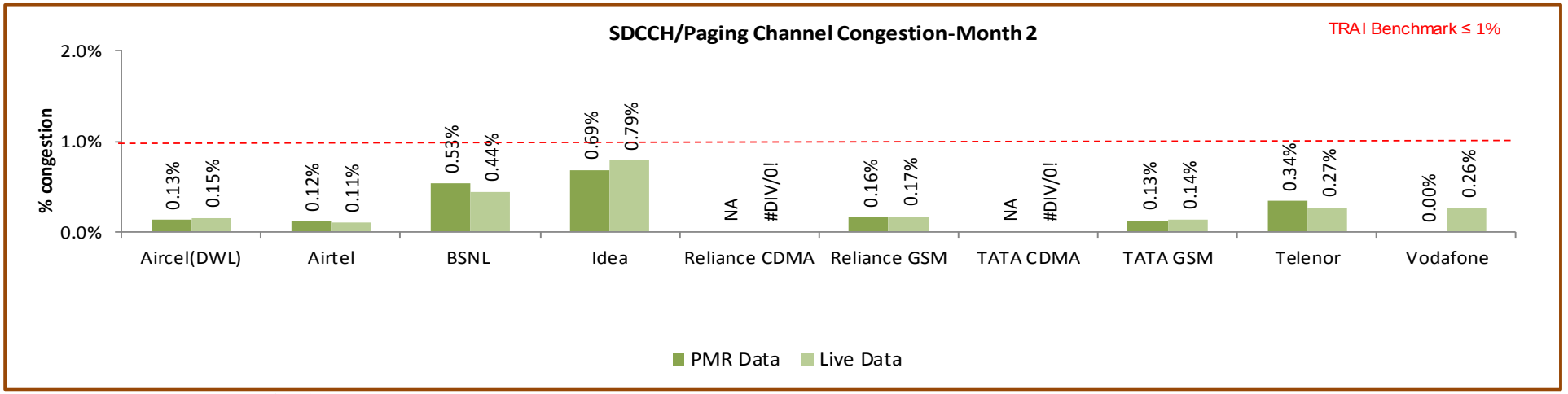
All operators met the benchmark as per PMR/audit Data.
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1



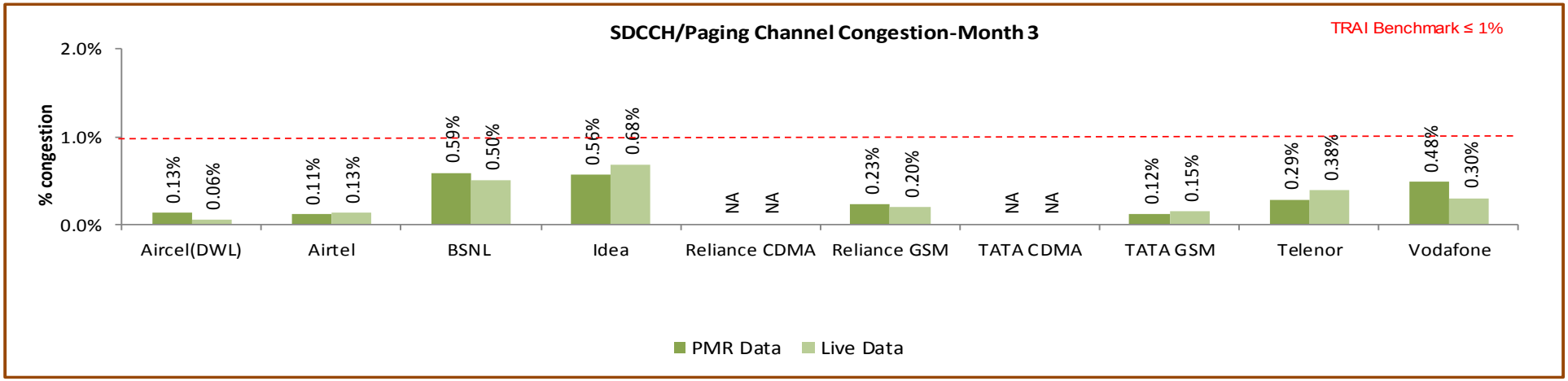
Data Source: Network Operations Center(NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



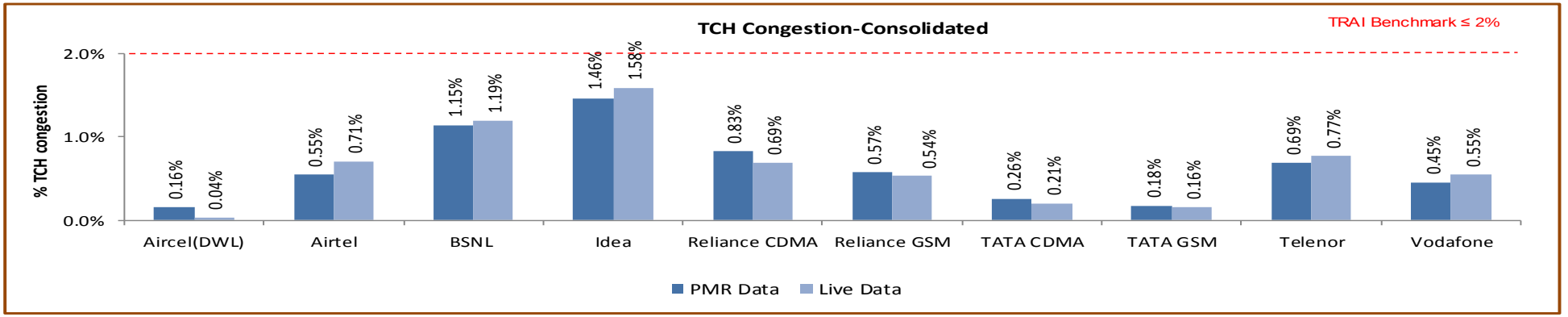
Data Source: Network Operations Center(NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

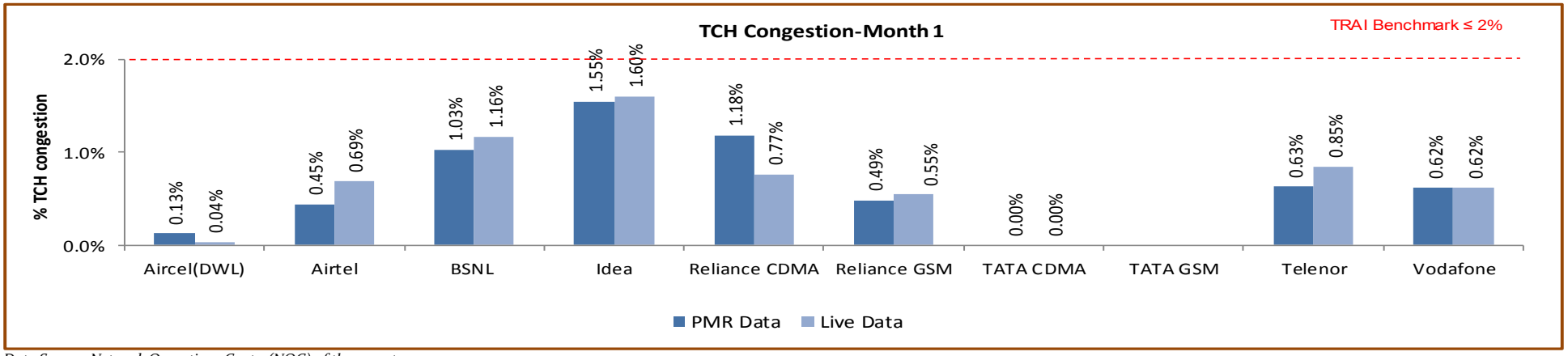


Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark as per audit/PMR report.

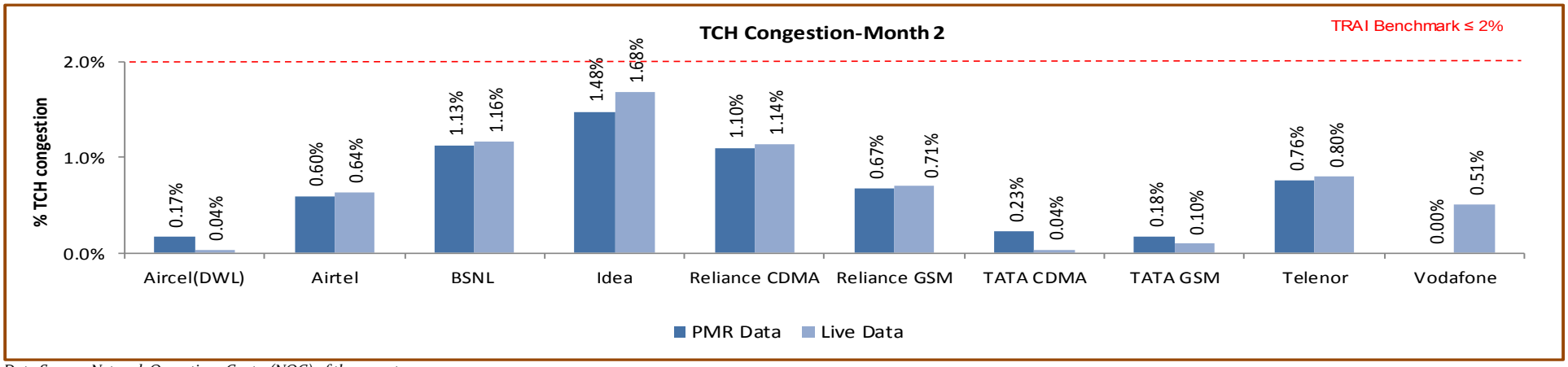
Significant difference was observed between PMR & live measurement data for Vodafone, BSNL, Telenor and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



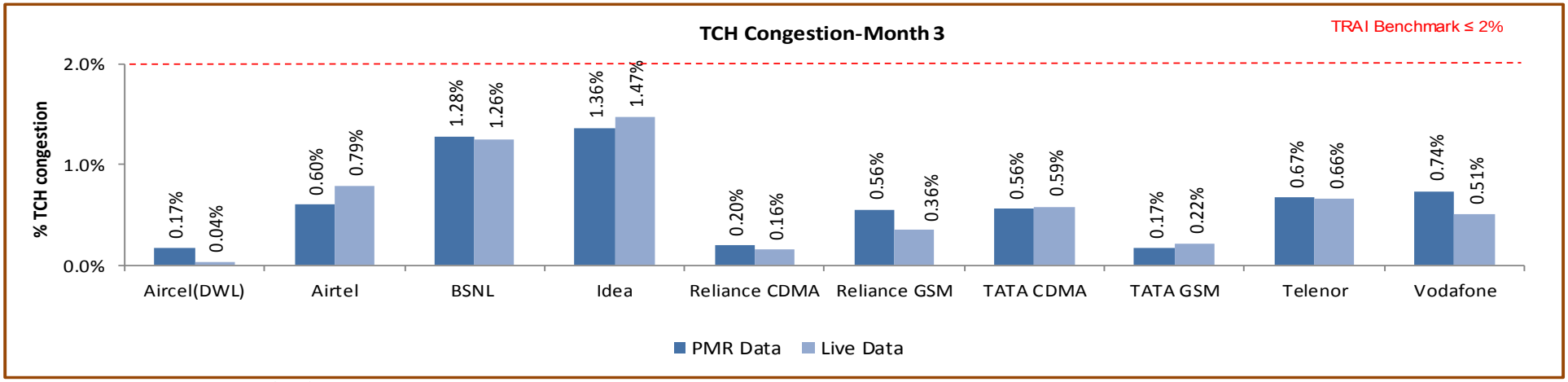
Data Source: Network Operations Center(NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

6.4.3.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

6.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		232	1483	189	2879	354	140	1189	582	79	485
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		56443	905676	312817	3466461	76730	78299	232241	202992	441808	6398044
Traffic served for all POIs (B)- in erlangs		37392	525806	173379	948536	19119	40570	92146	101835	247284	6160110
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		234	1516	189	2882	355	143	1189	582	77	485
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		56131	875685	310307	3469608	72855	77059	225972	201493	498123	6398044
Traffic served for all POIs (B)- in erlangs		17793	512214	176798	944379	17252	34732	92486	102755	255136	6160110
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		76	483	63	962	118	45	405	198	26	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18971	298277	104265	1157080	26220	25611	79247	68636	137132	289200
Traffic served for all POIs (B)- in erlangs		12313	173372	56343	317579	6266	13075	30633	33807	77564	157597
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	502	63	962	119	48	405	198	25	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18433	282355	104054	1157080	26676	25592	79247	68636	140092	289200
Traffic served for all POIs (B)- in erlangs		5841	167518	60012	317579	3769	6879	30633	33807	79959	157597
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	494	63	963	119	49	392	192	27	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18464	304913	104054	1158552	26575	25819	76559	66944	163410	289212
Traffic served for all POIs (B)- in erlangs		12578	178295	60012	322439	6541	14137	30650	34388	84557	161518
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	509	63	963	119	48	392	192	26	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18433	293647	104054	1158552	25039	24276	76435	67412	216483	289212
Traffic served for all POIs (B)- in erlangs		5841	177736	60012	322439	6401	13749	30433	35588	88497	161518
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	506	63	954	117	46	392	192	26	67
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19007	302485	104498	1150830	23935	26869	76435	67412	141266	5819632
Traffic served for all POIs (B)- in erlangs		12501	174138	57024	308518	6311	13358	30863	33639	85163	5840995
POI congestion	≤0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		78	505	63	957	117	47	392	192	26	67
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	299682	102199	1153976	21140	27191	70290	65446	141548	5819632
Traffic served for all POIs (B)- in erlangs		6111	166960	56773	304362	7081	14104	31420	33360	86680	5840995
POI congestion	≤0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

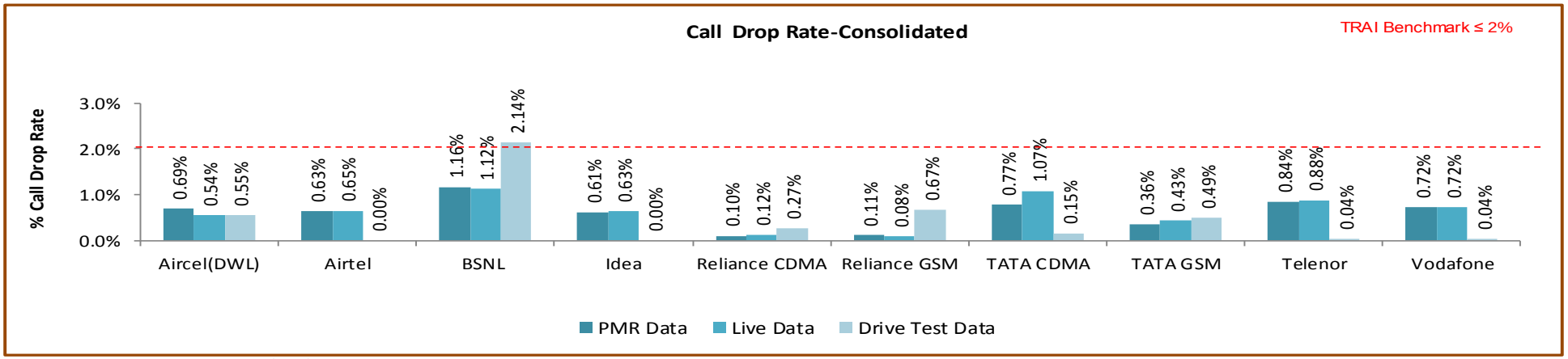
Data Source: Network Operations Center(NOC) of the operators

6.5 CALL DROP RATE

6.5.1 PARAMETER DESCRIPTION

1. **Definition -** The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
    - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
    - **Total calls established** = All calls that have TCH allocation during busy hour
2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**
3. **TRAI Benchmark –**
    - Call drop rate ≤ 2%
4. **Audit Procedure –**
    - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
    - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

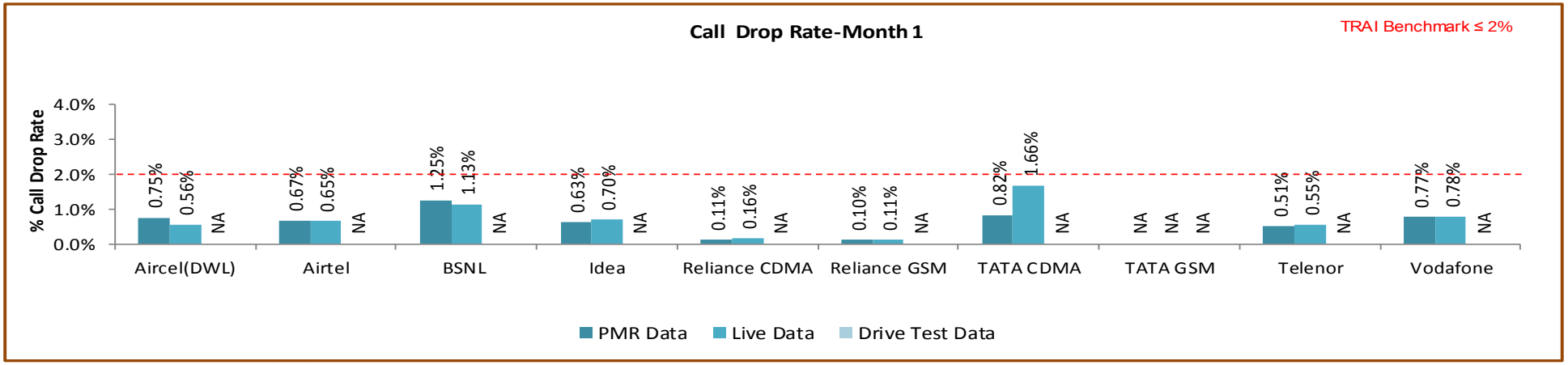
6.5.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

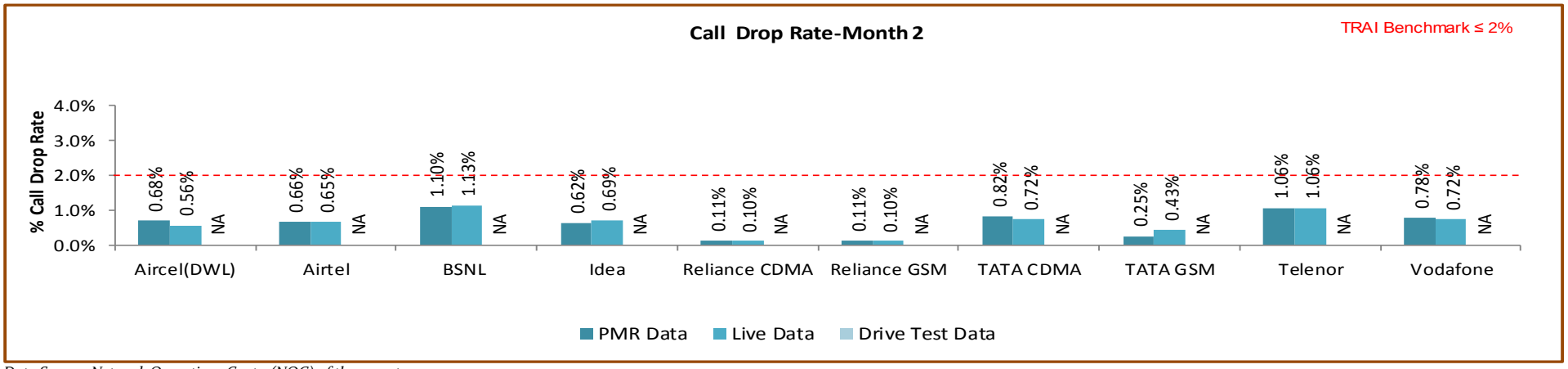
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



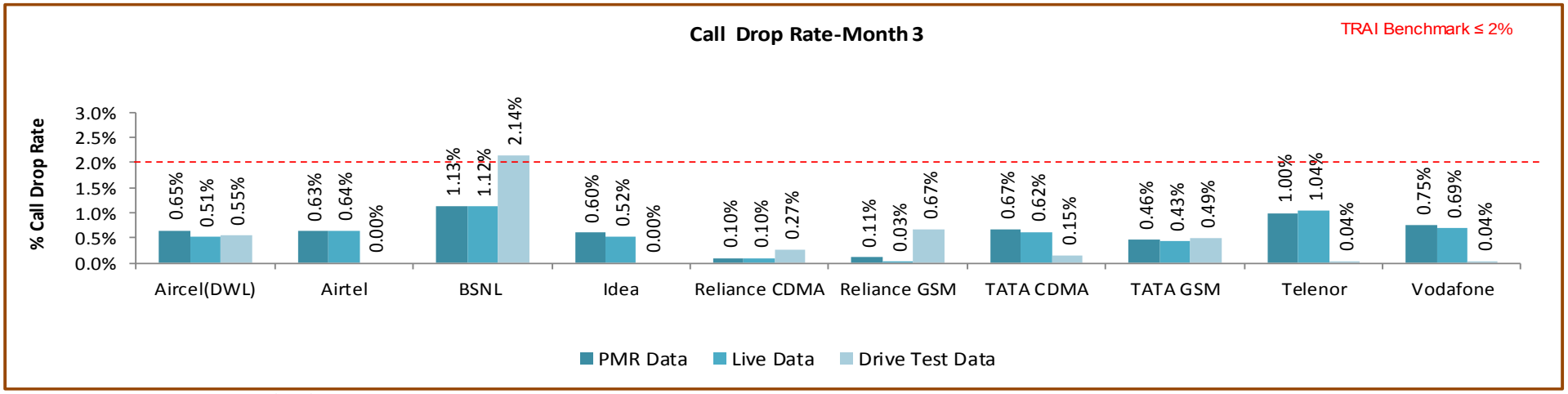
Data Source: Network Operations Center(NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

6.5.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

6.6 CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.

2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**

3. **TRAI Benchmark –**

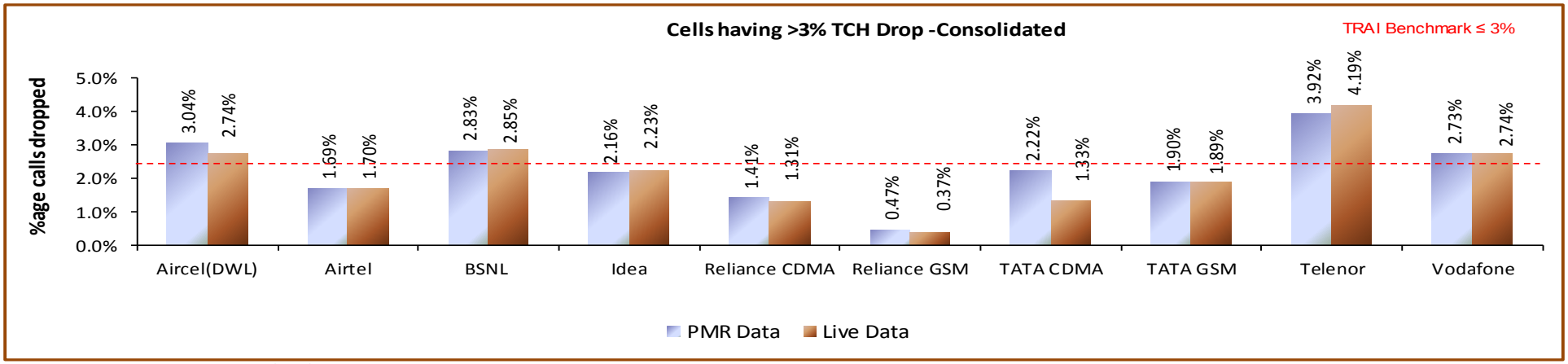
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure –**

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

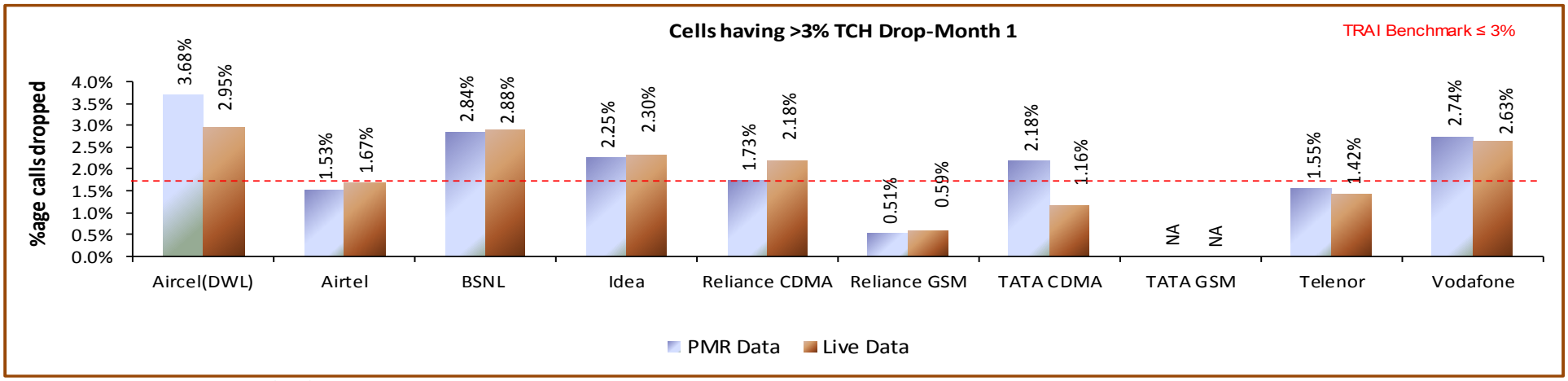
6.6.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

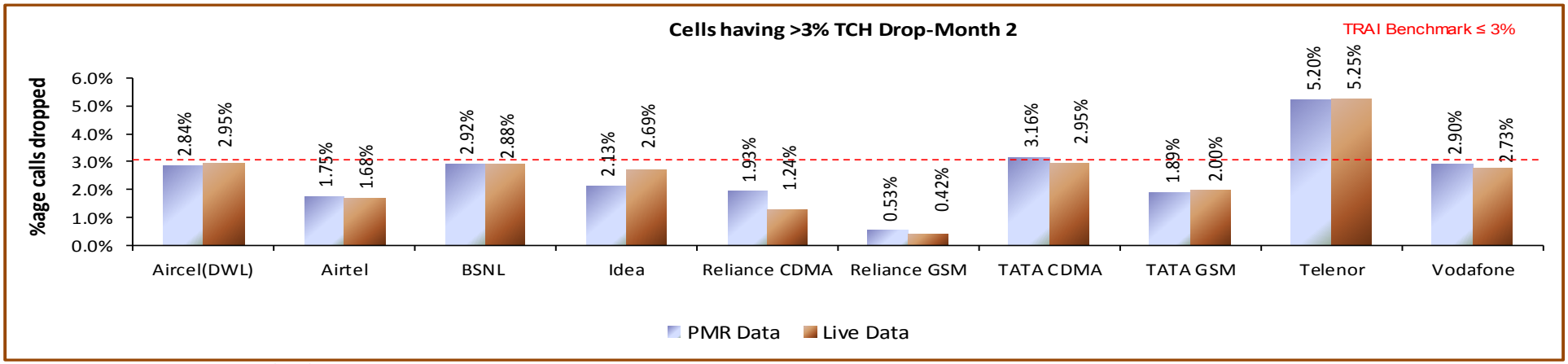
Aircel, BSNL and Telenor failed to meet the TRAI benchmark.

6.6.2.1 KEY FINDINGS – MONTH 1



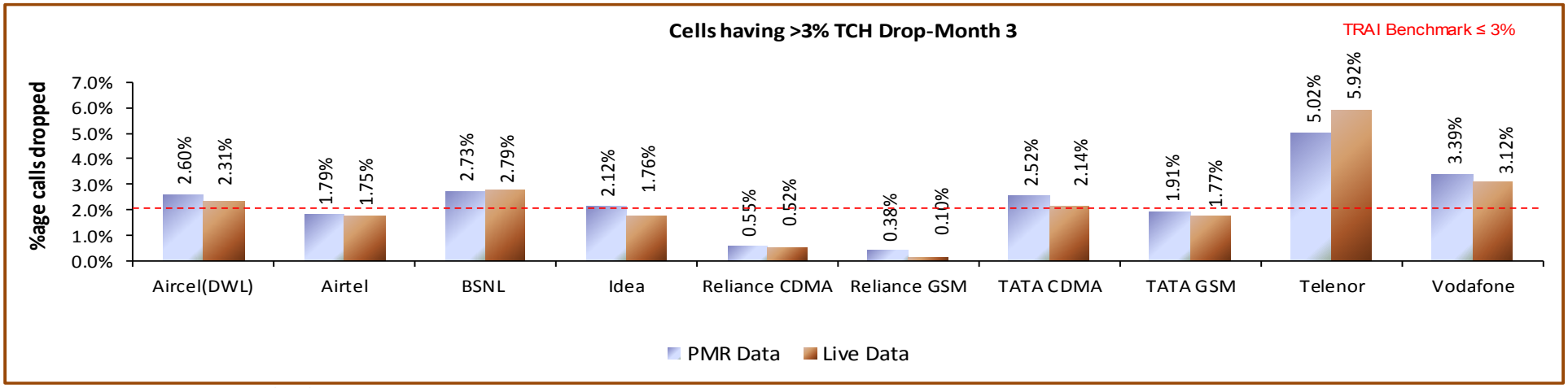
Data Source: Network Operations Center(NOC) of the operators

6.6.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

6.6.2.3 KEY FINDINGS – MONTH 3



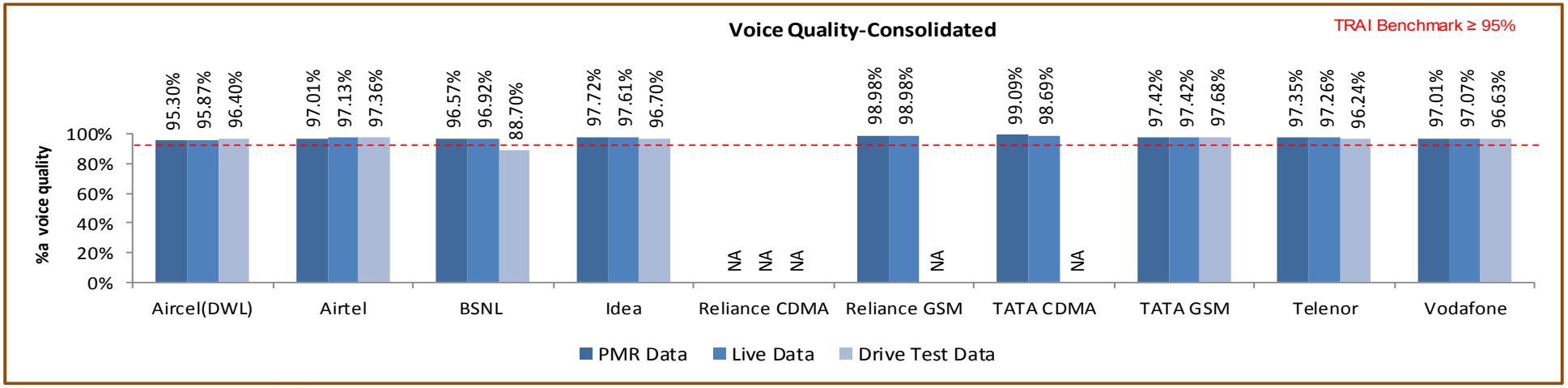
Data Source: Network Operations Center(NOC) of the operators

6.7 VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

1. **Definition:**
   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %
2. **Computational Methodology:**
   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**
3. **TRAI Benchmark:** ≥ 95%
4. **Audit Procedure –**
   a. A sample of calls would be taken randomly from the total calls established.
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

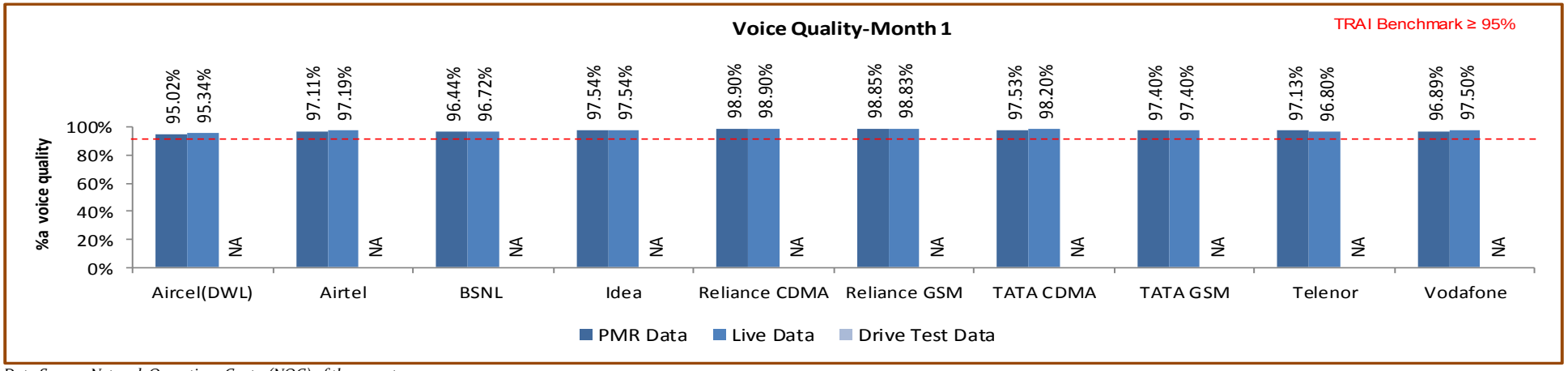
6.7.2 KEY FINDINGS



Data Source: Network Operations Center(NOC) of the operators

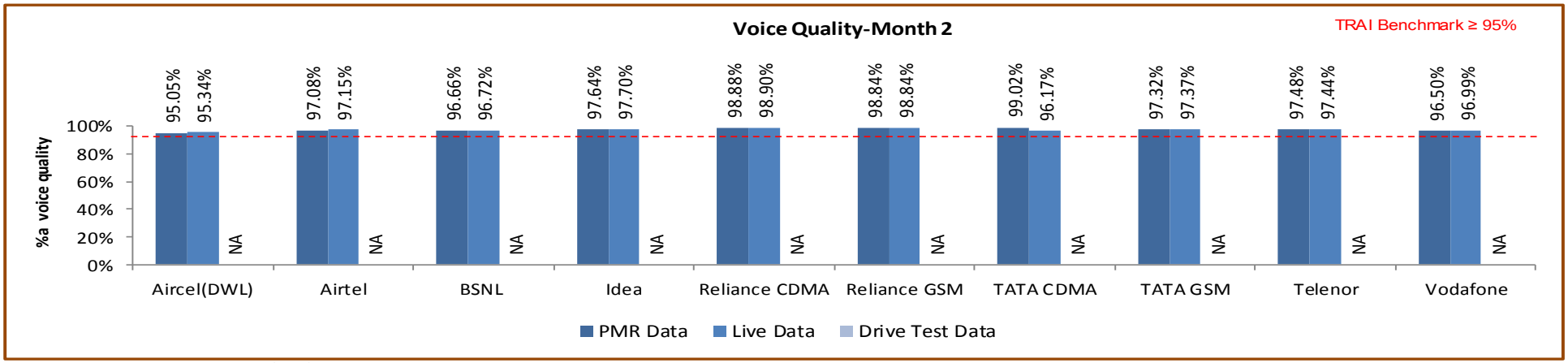
TATA CDMA failed to meet the benchmark for Voice quality.

6.7.2.1 KEY FINDINGS – MONTH 1



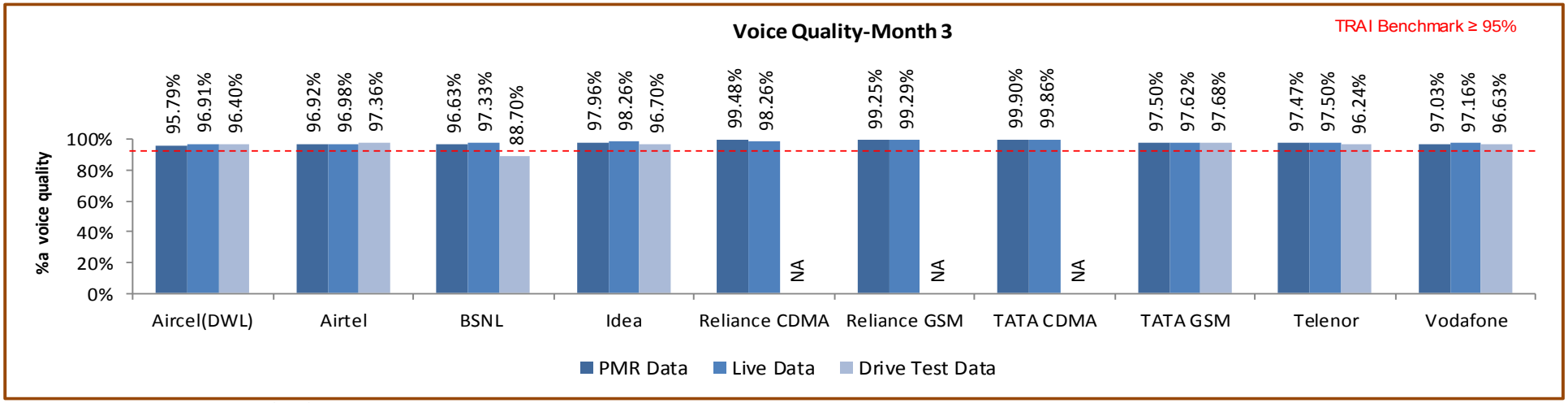
Data Source: Network Operations Center(NOC) of the operators

6.7.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

6.7.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

7.1 NODE BS DOWNTIME

7.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

- **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- **Source of Data:** Network Operation Center (NOC) or a Central Server
- **Computation Methodology –**
  Node Bs downtime (not available for service) = Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100

3. TRAI Benchmark –

a. Node Bs downtime (not available for service) ≤ 2%

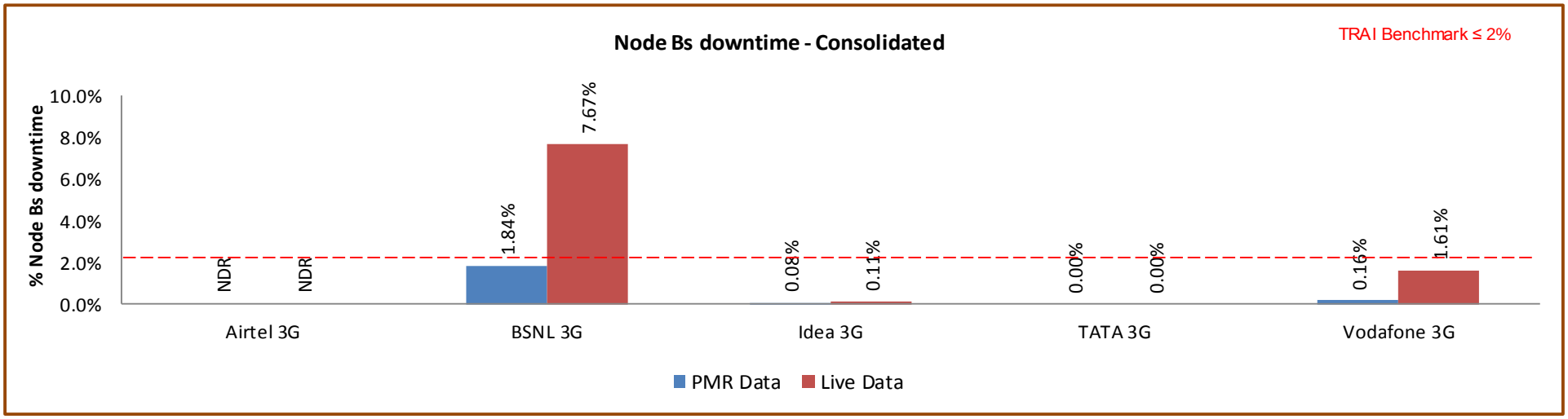
4. Audit Procedure –

- The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

- All the Node Bs in service area was considered. Planned outages due to network up gradation, routine maintenance were not considered.
- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
    - When there is any outage a performance report gets generated in line with that cell resulting and master base of the Node Bsdowntime and worst affected Node Bs due to downtime.

7.1.2 KEY FINDINGS - CONSOLIDATED

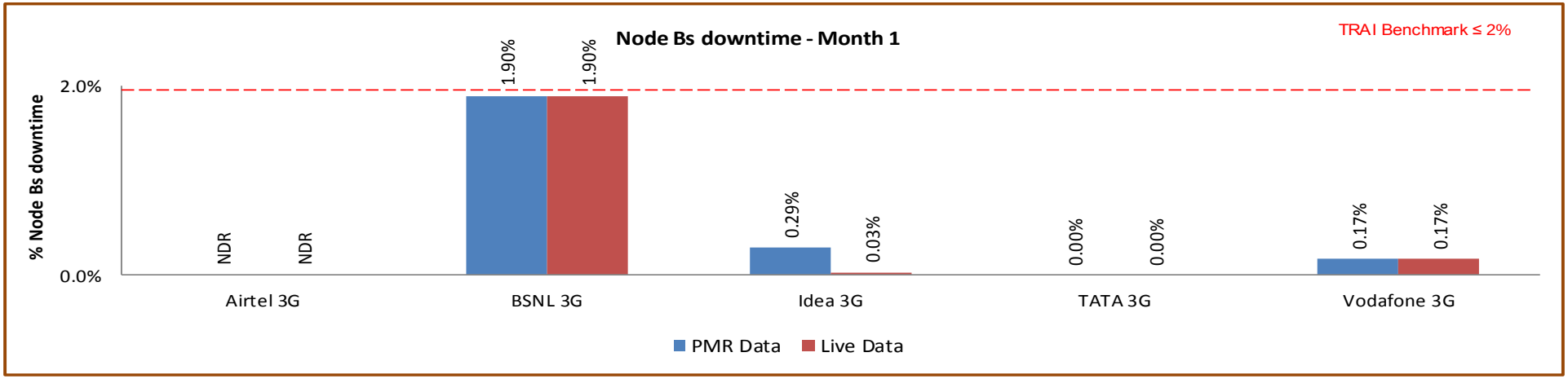
©



Data Source: Operations and Maintenance Center (OMC) of the operators

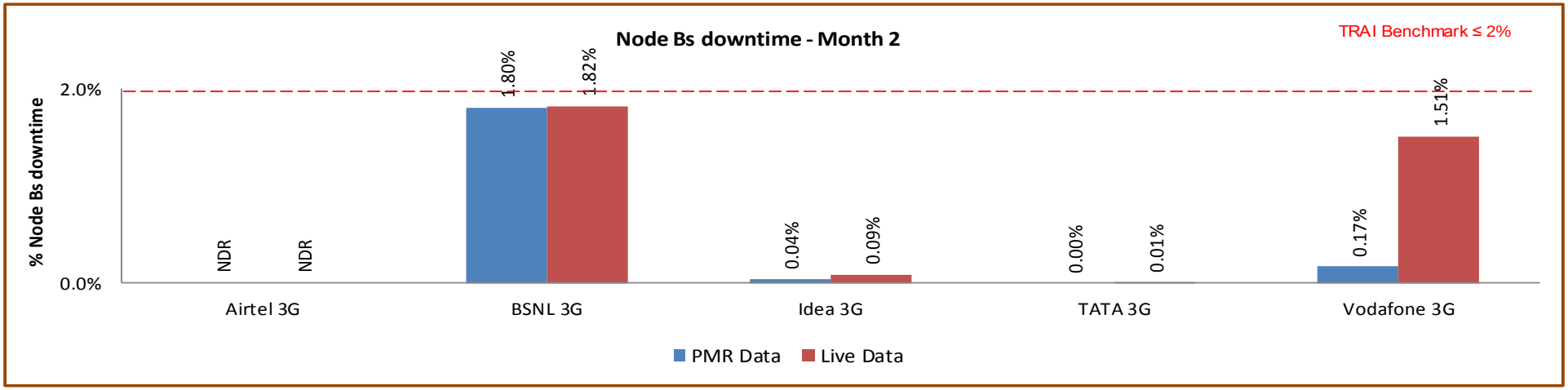
All operators met the TRAI benchmark.

7.1.2.1 KEY FINDINGS – MONTH 1



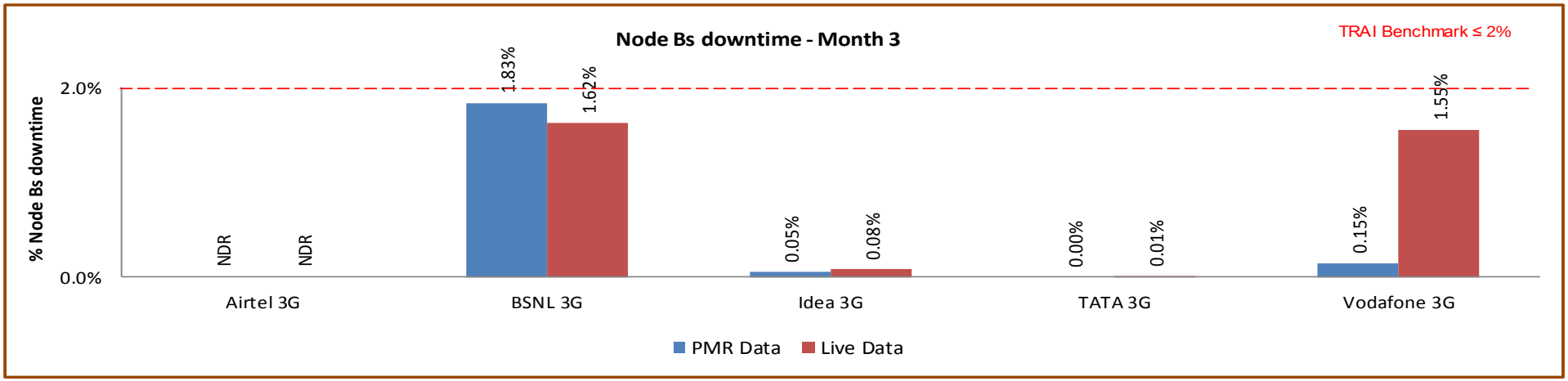
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

7.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1 PARAMETER DESCRIPTION

- **Definition – Worst Affected Node Bs due to downtime** shall basically measure percentage of Node Bs having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

  For measuring the parameter "Percentage of worst affected Node Bs due to downtime" the downtime of each Node B lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology –**

  Worst affected Node Bs due to downtime = (Number of Node Bs having accumulated downtime greater than 24 hours in a month /Number of Node Bs in Licensed Service Area) * 100

- **TRAI Benchmark –**

  b. Worst affected Node Bss due to downtime ≤ 2%

- **Audit Procedure –**

  i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii. All the Node Bs in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

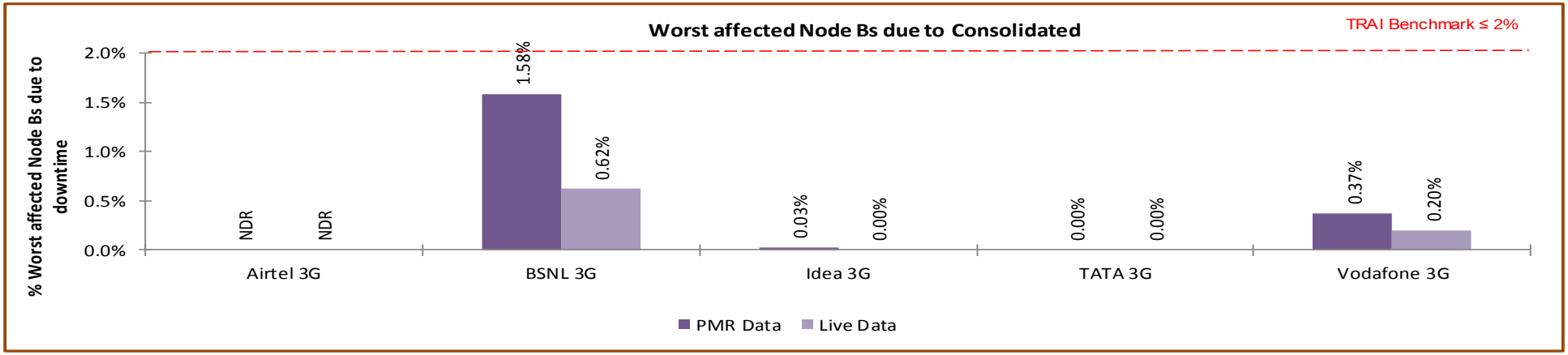
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv. Any outage as a result of force majeure was not considered at the time of calculation.

  v. List of operating sites with cell details and ids are taken from the operator.

vi. All the Node Bs having down time greater than 24 hours is assessed and values of NodeBs accumulated downtime is computed in accordance.

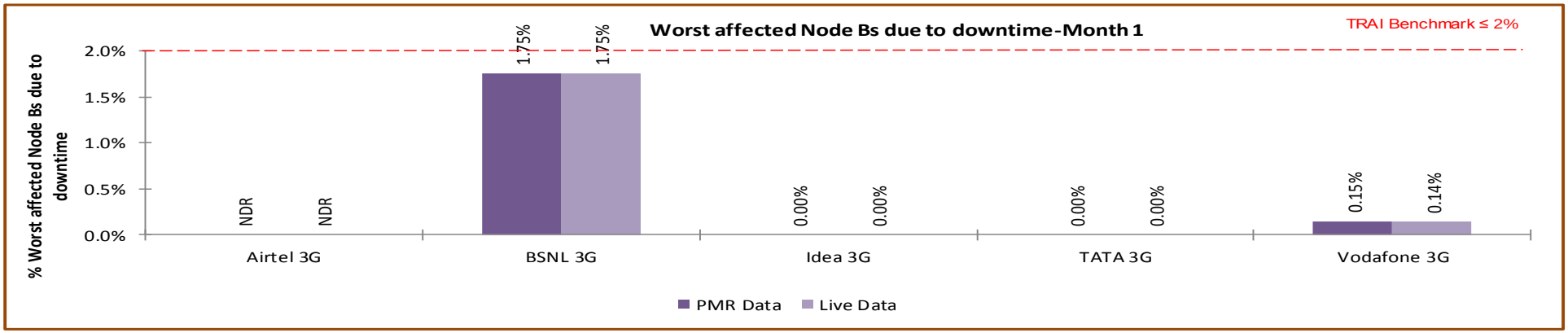
7.2.2 KEY FINDINGS – CONSOLIDATED



Data Source: Operations and Maintenance Center (OMC) of the operators

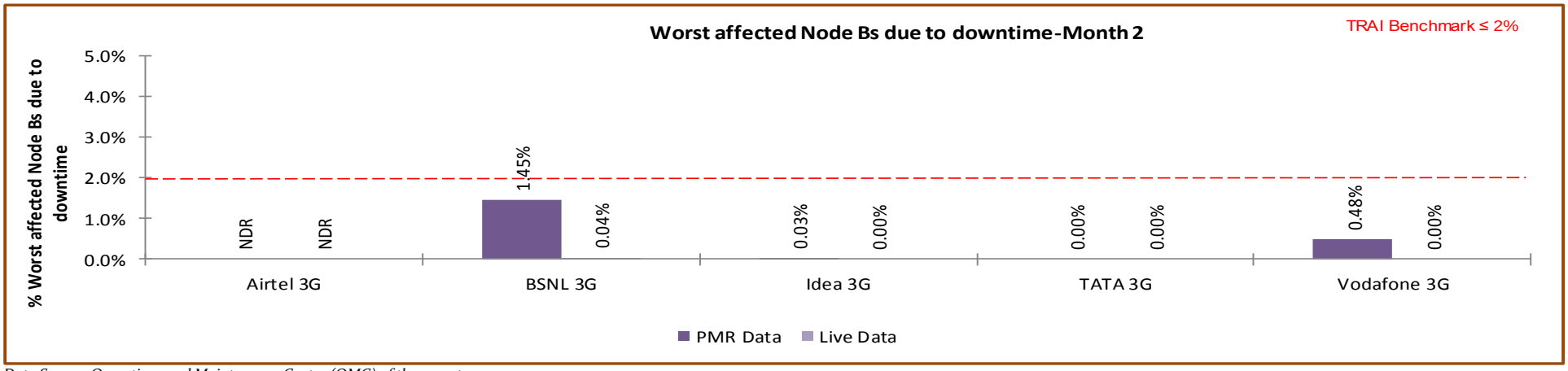
All operators met the TRAI benchmark for worst affected Node Bs due to downtime as per audit/PMR data.

7.2.2.1 KEY FINDINGS – MONTH 1



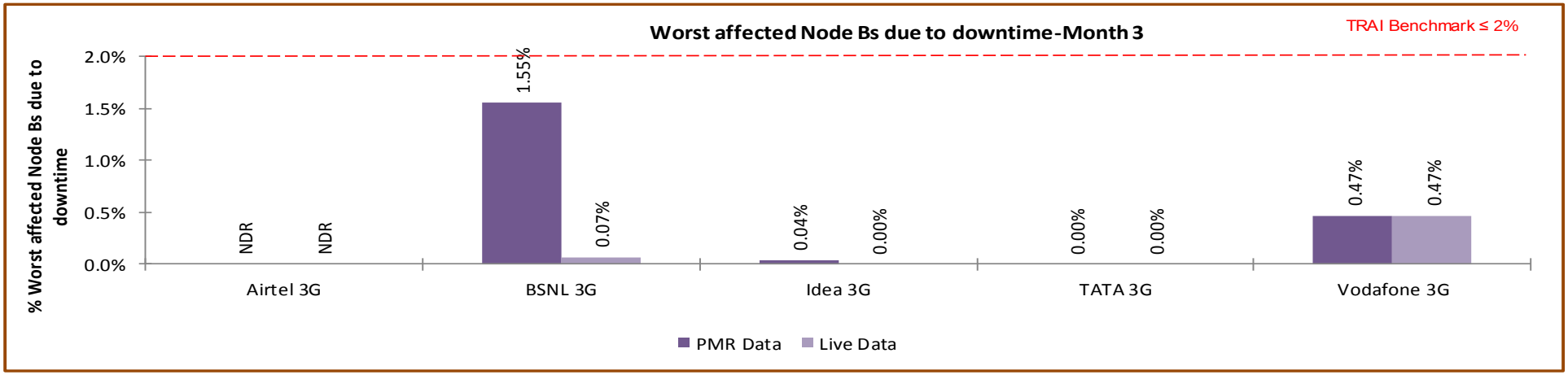
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

7.3 CALL SET UP SUCCESS RATE

7.3.1 PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   - RRC attempt is made
   - The RRC established
   - The RRC is routed to the outward path of the concerned MSC

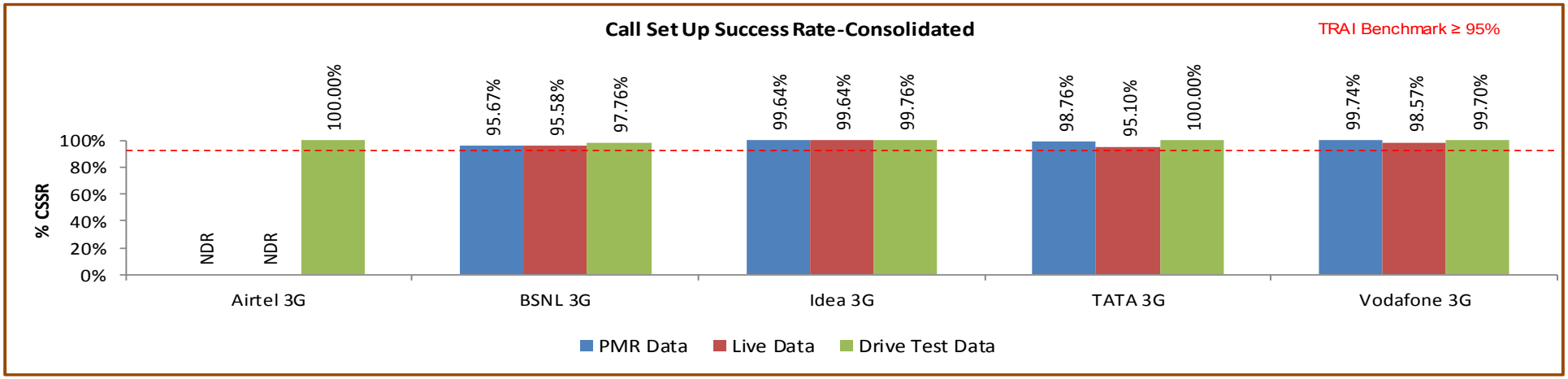
5. **TRAI Benchmark≥** 95%

6. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

- CSSR calculation should be measured using OMC generated data only
- Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- Counter data is extracted from the NOC of the operators.
- Total calls established include all calls established excluding RAB congestion.
  - The numerator and denominator values are derived from adding the counter values from the MSC.

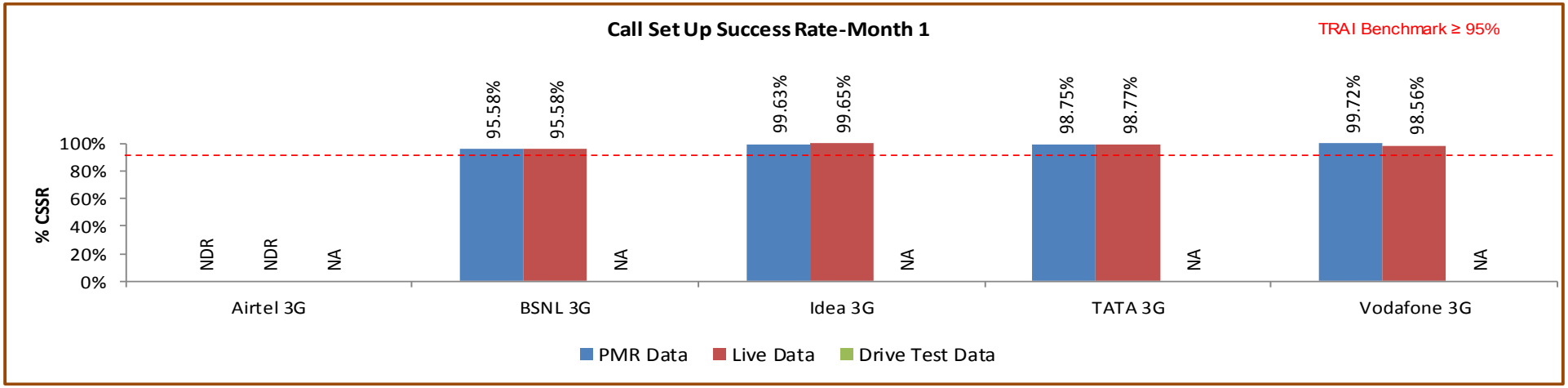
7.3.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

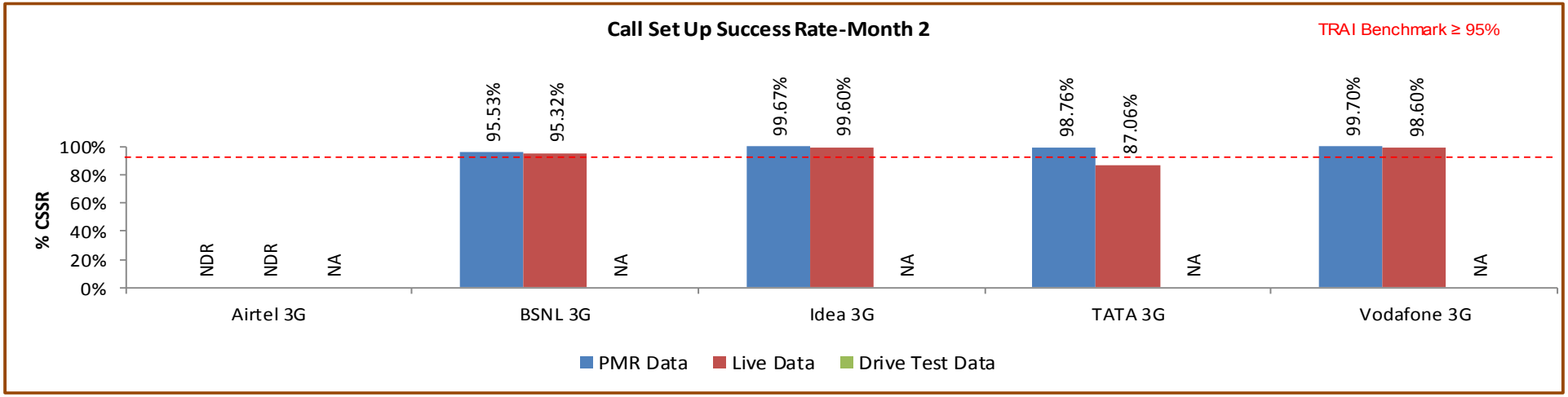
All operators met the TRAI benchmark as per audit/PMR 3days live as well as drive test data.

7.3.2.1 KEY FINDINGS – MONTH 1



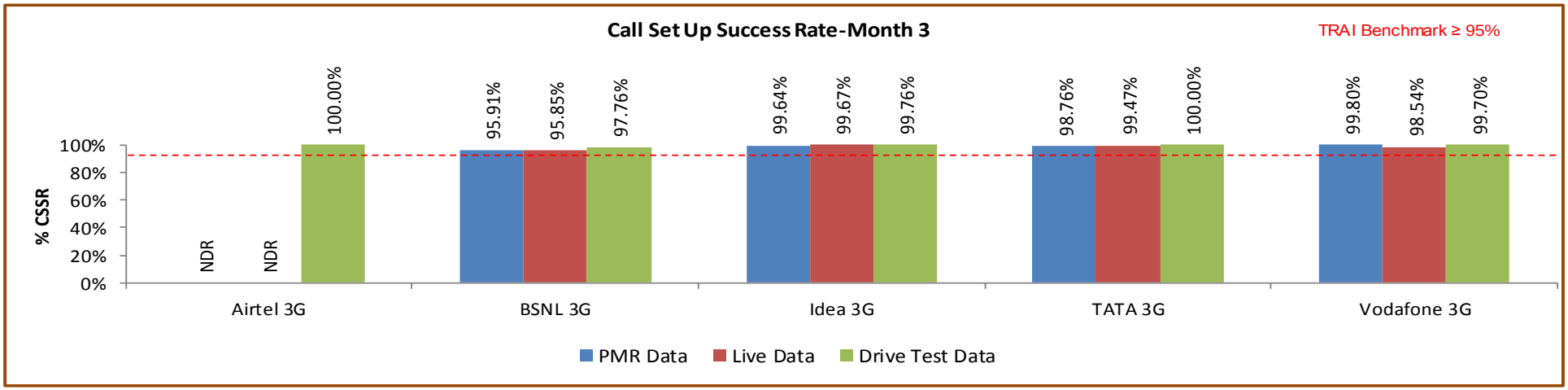
Data Source: Network Operations Center(NOC) of the operators

7.3.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

7.3.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7.4 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

7.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.
    - RRC Level: Stand-alone dedicated control channel
    - RAB Level: Traffic Channel
    - POI Level: Point of Interconnect
4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**
    - **RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
        - Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1
        - C1 = Average RRC / RAB Congestion % on day 1
        - A2 = Number of attempts to establish RRC / RAB made on day 2
        - C2 = Average RRC / RAB Congestion % on day 2
        - An = Number of attempts to establish RRC / RAB made on day n
        - Cn = Average RRC / RAB Congestion % on day n

- **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
  - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
  - C1 = Average POI Congestion % on day 1
  - A2 = POI traffic offered on all POIs (no. of calls) on day 2
  - C2 = Average POI Congestion % on day 2
  - An = POI traffic offered on all POIs (no. of calls) on day n
  - Cn = Average POI Congestion % on day n

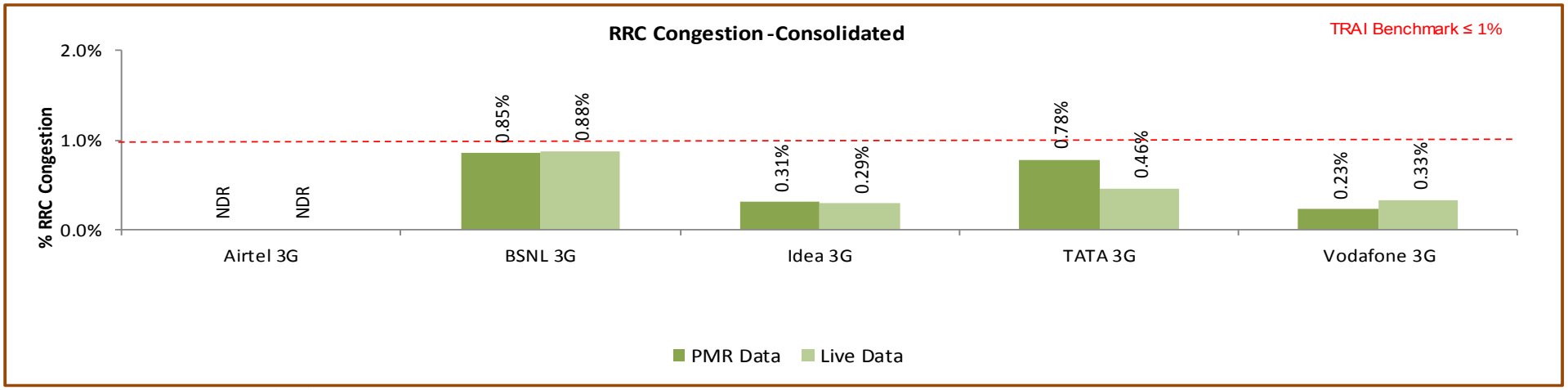
7. Benchmark:

- RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. Audit Procedure –

- Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
  - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

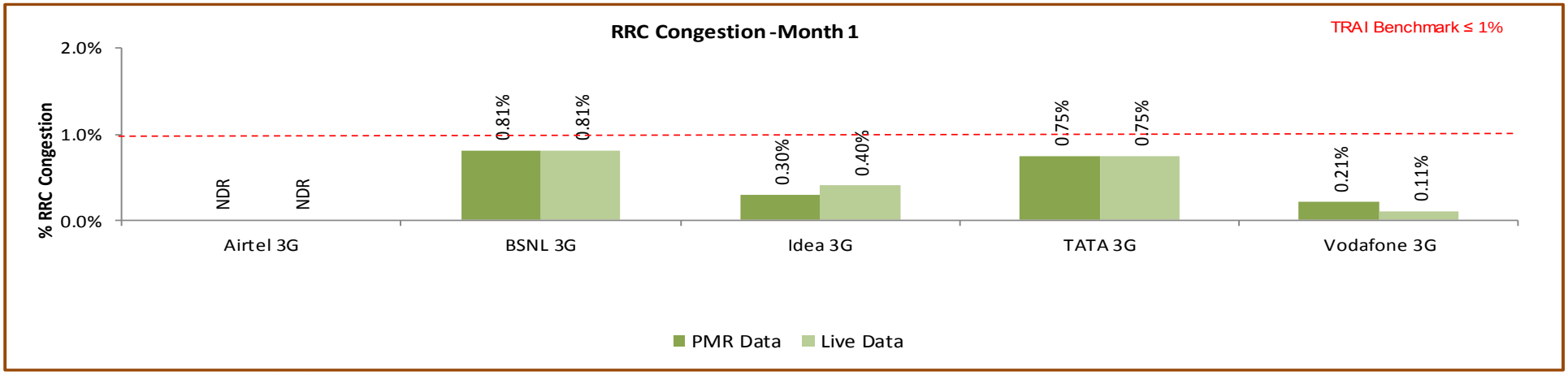
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



Data Source: Network Operations Center(NOC) of the operators

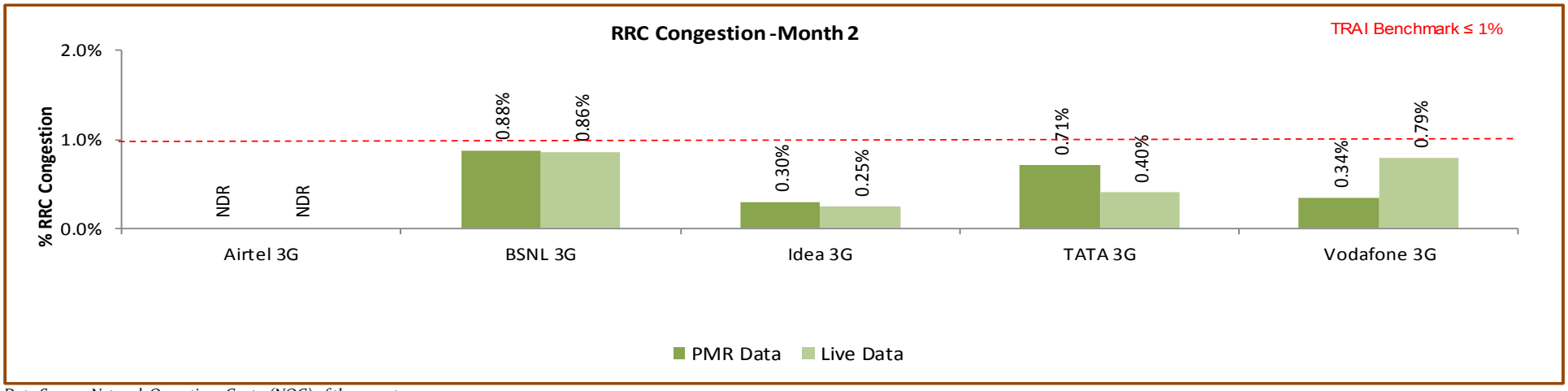
All operators met the TRAI benchmark for PMR and live audit.

7.4.2.1 KEY FINDINGS – MONTH 1



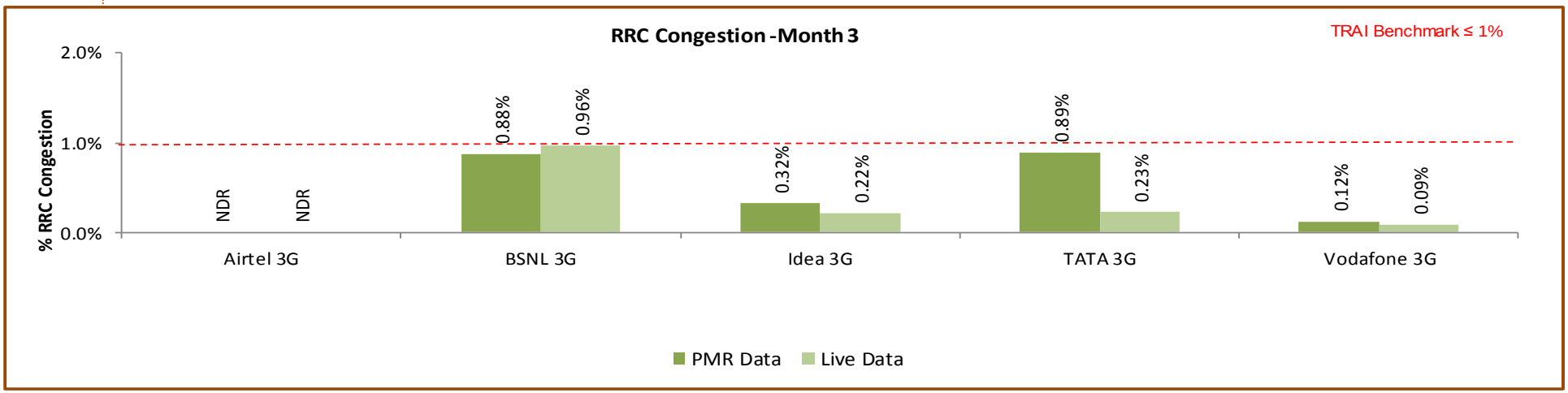
Data Source: Network Operations Center(NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



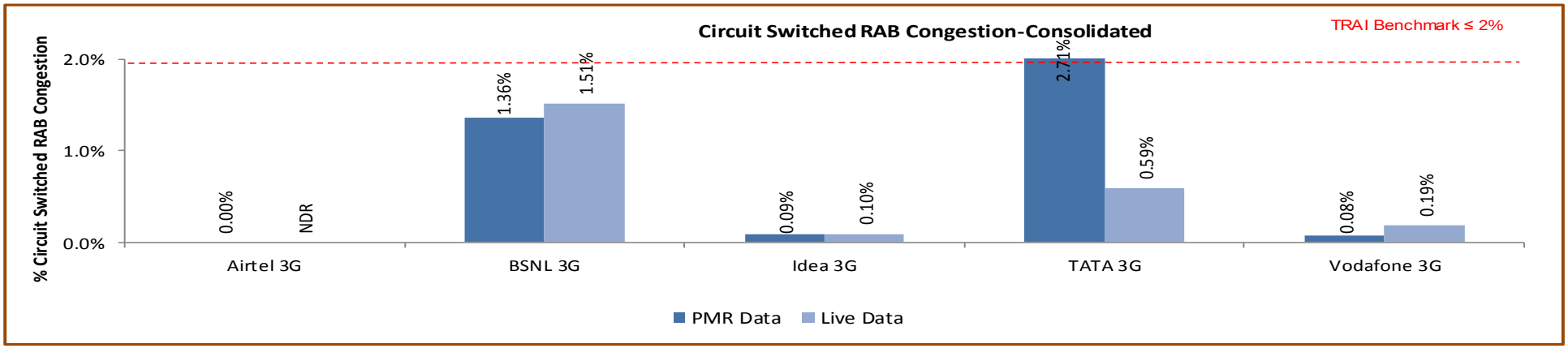
Data Source: Network Operations Center(NOC) of the operators

7.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

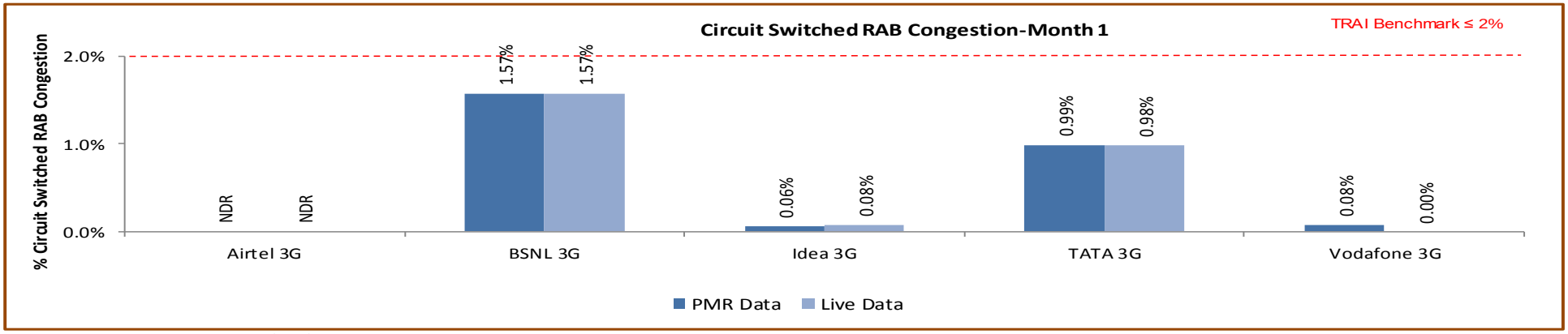


Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark as per audit/PMR report.

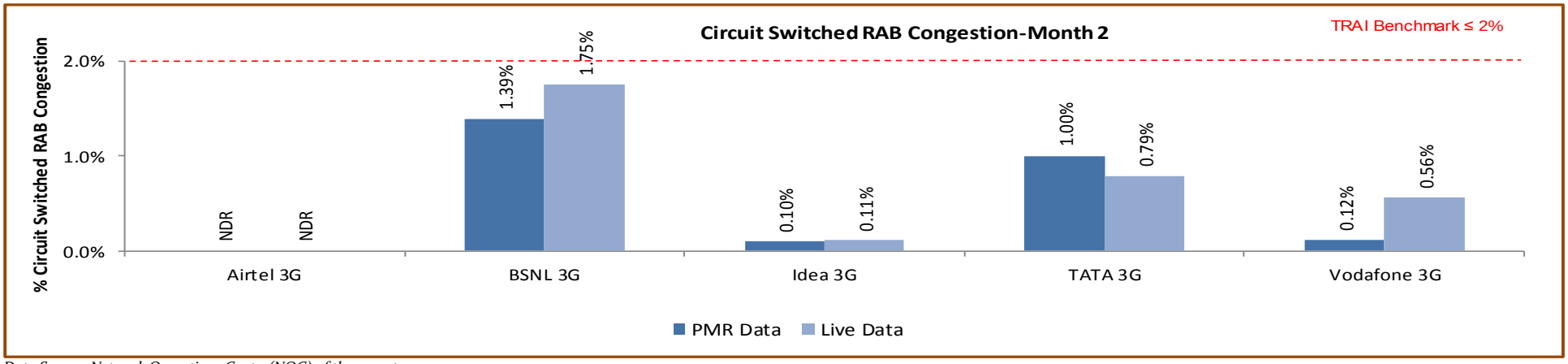
Significant difference was observed between PMR & live measurement data for BSNL and TATA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



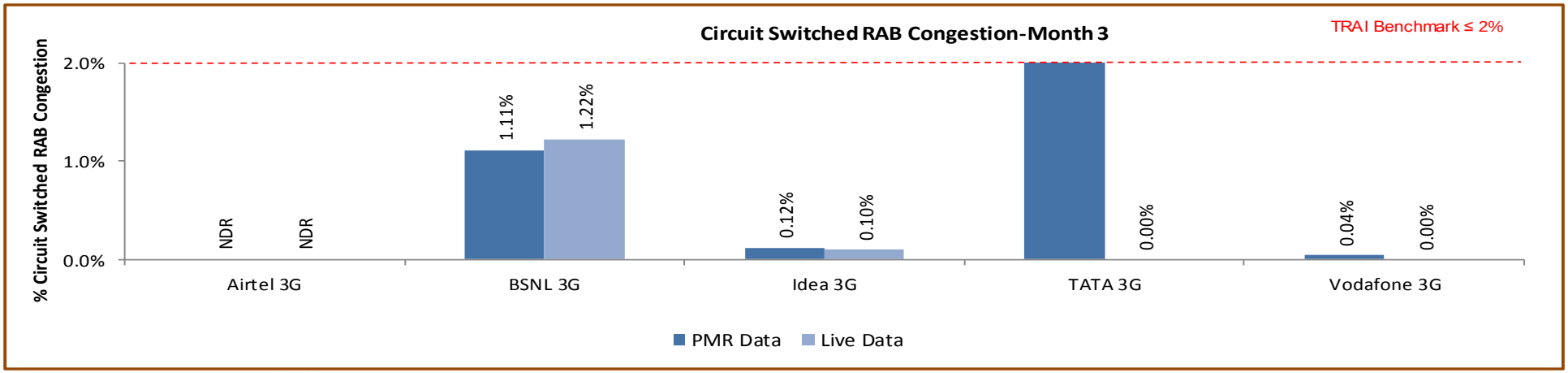
Data Source: Network Operations Center(NOC) of the operators

7.4.3.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

7.4.3.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion- PMR data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total number of working POIs		0	189	2879	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	313135	3467399	201423	0
Traffic served for all POIs (B)- in erlangs		0	172373	942380	102416	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total number of working POIs		0	189	2882	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	310518	3470545	199924	0
Traffic served for all POIs (B)- in erlangs		0	173128	938223	103336	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

7.4.4.1 KEY FINDINGS – MONTH 1

©

Audit Results for POI Congestion- PMR data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	962	192	NA
No. of POIs not meeting benchmark		NDR	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		NDR	104265	1157080	66944	NA
Traffic served for all POIs (B)- in erlangs		NDR	56343	317579	34388	NA
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	NA
Live Measurement Results for POI Congestion- 3 Day data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	962	192	NA
No. of POIs not meeting benchmark		NDR	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		NDR	104265	1157080	66944	NA
Traffic served for all POIs (B)- in erlangs		NDR	56343	317579	34388	NA
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	NA

Data Source: Network Operations Center(NOC) of the operators

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	963	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104372	1159489	66944	0
Traffic served for all POIs (B)- in erlangs		NDR	59006	316283	34388	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	963	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104054	1159489	67534	0
Traffic served for all POIs (B)- in erlangs		NDR	60012	316283	35588	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	954	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104498	1150830	67534	0
Traffic served for all POIs (B)- in erlangs		NDR	57024	308518	33639	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	957	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	102199	1153976	65446	0
Traffic served for all POIs (B)- in erlangs		NDR	56773	304362	33360	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

1. **Definition** - The Call Drop Rate measures the inability of Network to maintain a call and is defined as the ratio of abnormal speech disconnects with respect to all speech disconnects (both normal and abnormal). In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason.

   - **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** **(No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released)x 100**

Key Performance Indicator Term	Definition
#RAB Normal Release(CSV)	Number of voice RAB normally Released
#RAB Abnormal Release(CSV)	Number of voice RAB abnormally Released

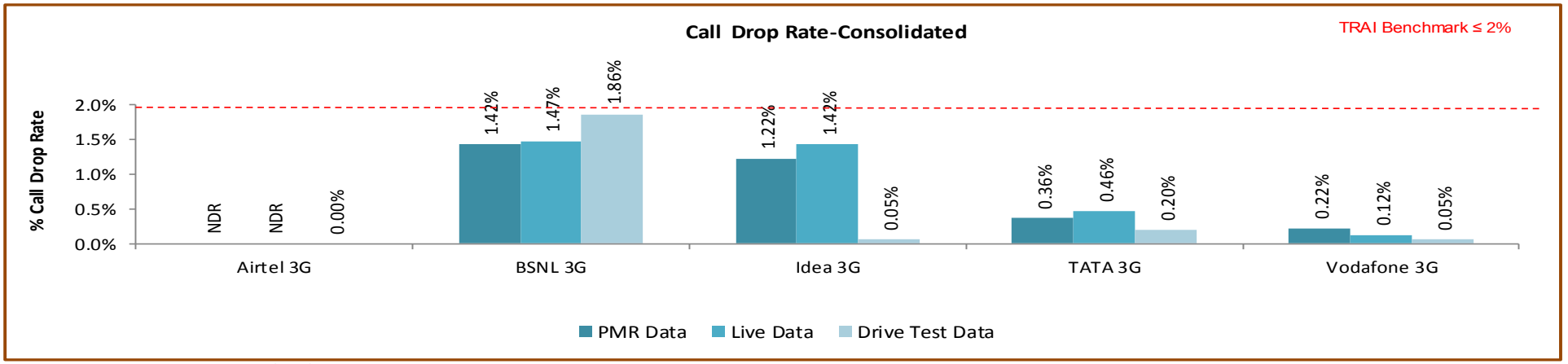
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
   - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

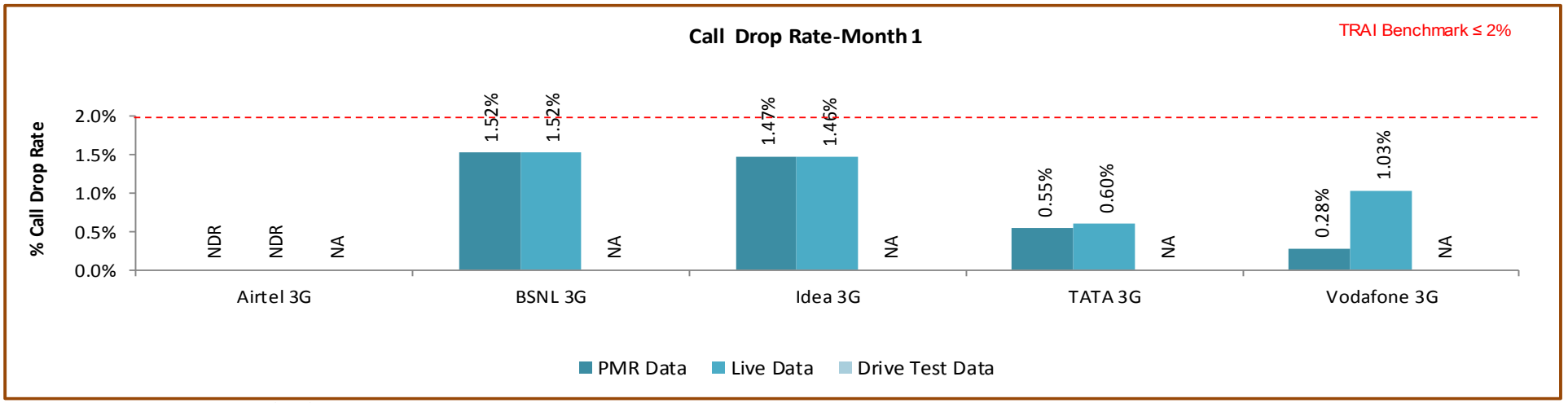
7.5.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

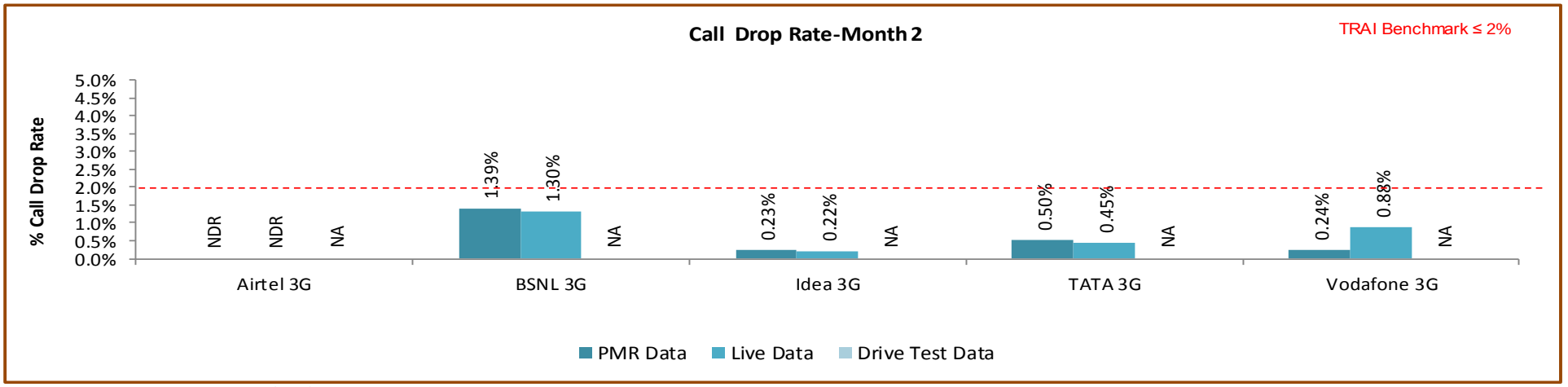
All operators met the benchmark for call drop rate during audit.

7.5.2.1 KEY FINDINGS – MONTH 1



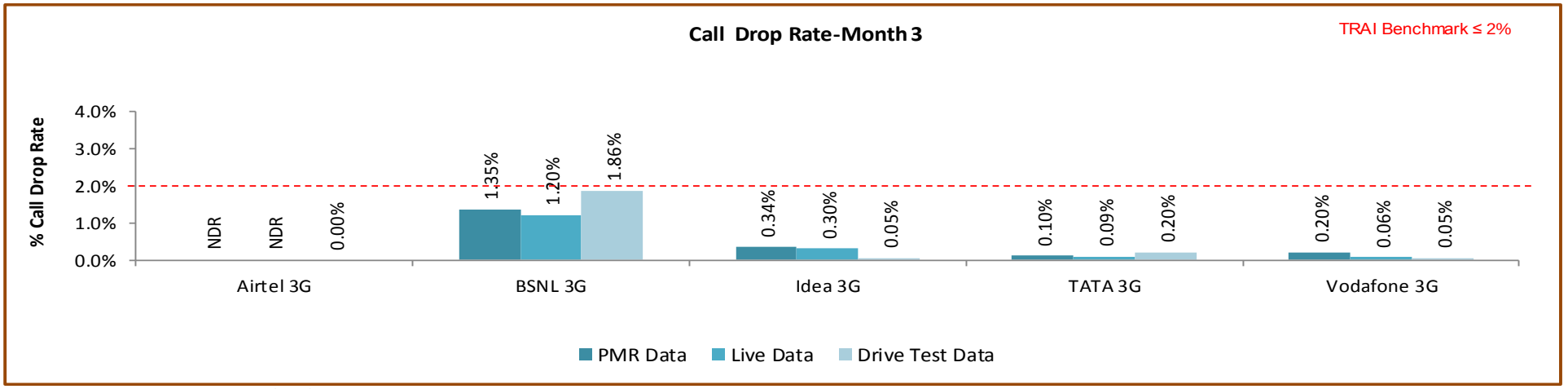
Data Source: Network Operations Center(NOC) of the operators

7.5.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

7.5.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7.6 WORST AFFECTED CELLS HAVING MORE THAN 3% CIRCUIT SWITCHED VOICE DROP RATE

7.6.1 PARAMETER DESCRIPTION

1. **Definition- Cells having more than 3% circuit switch voice quality:** The existing parameter has been amended to cover 3G Networks to assess worst affected cells having more than 3% CSV Drop Rate.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (**Number of cells having CSV drop rate > 3% during CBBH in a month**/ **Total number of cells in the licensed area) x 100**

5. **TRAI Benchmark** –

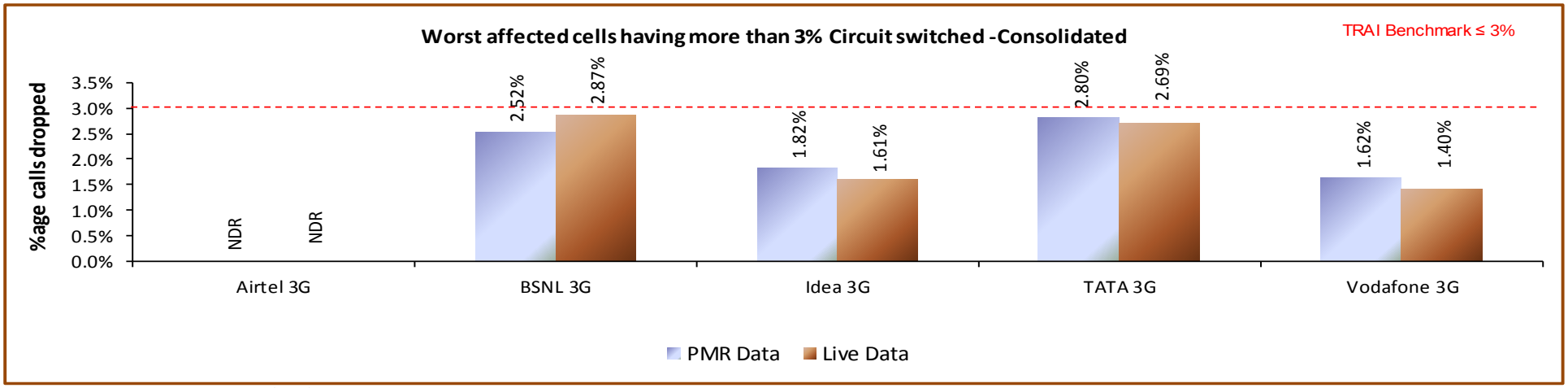
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure** –

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

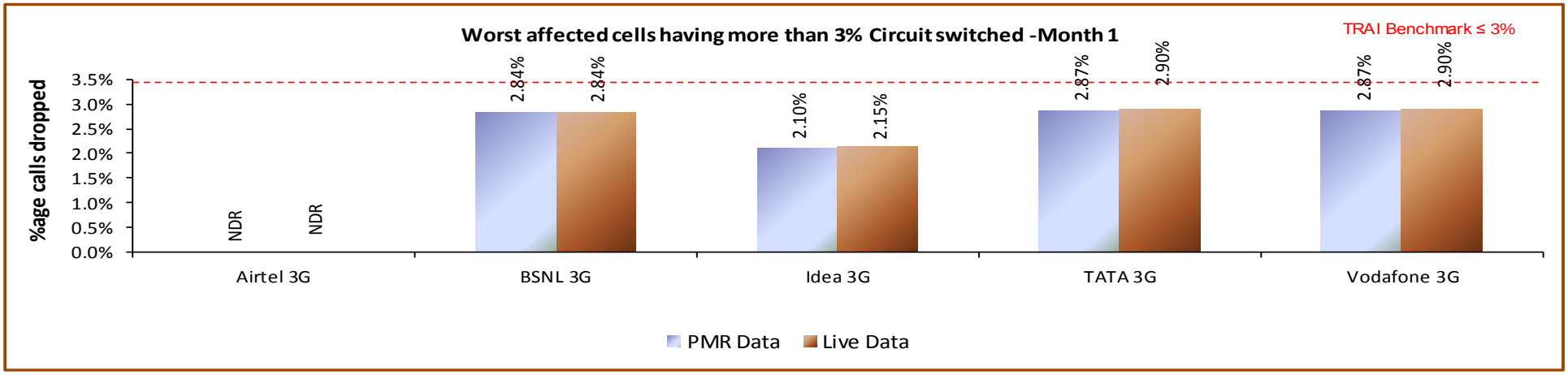
7.6.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center(NOC) of the operators

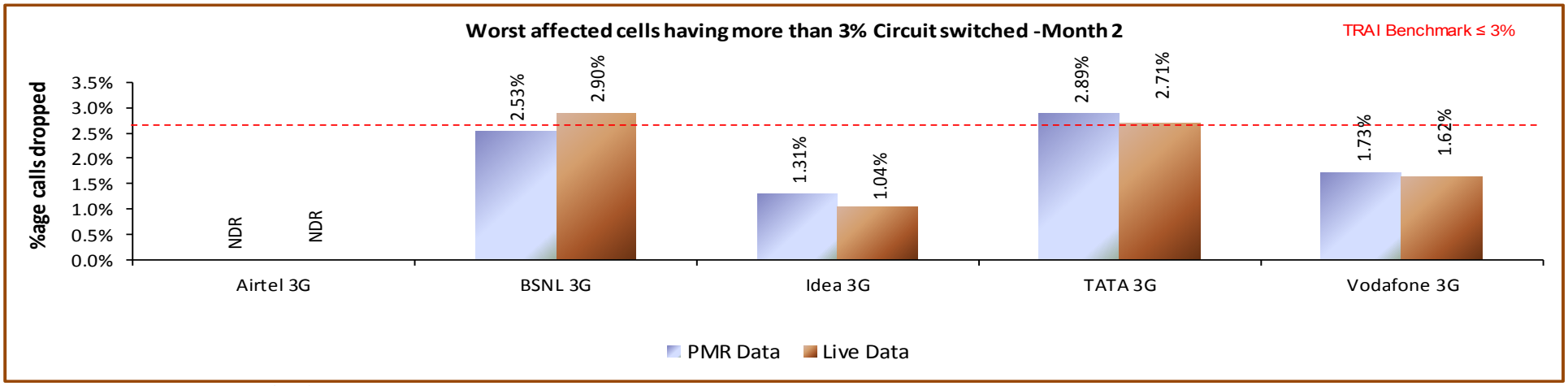
All operators met the benchmark during audit.

7.6.2.1 KEY FINDINGS – MONTH 1



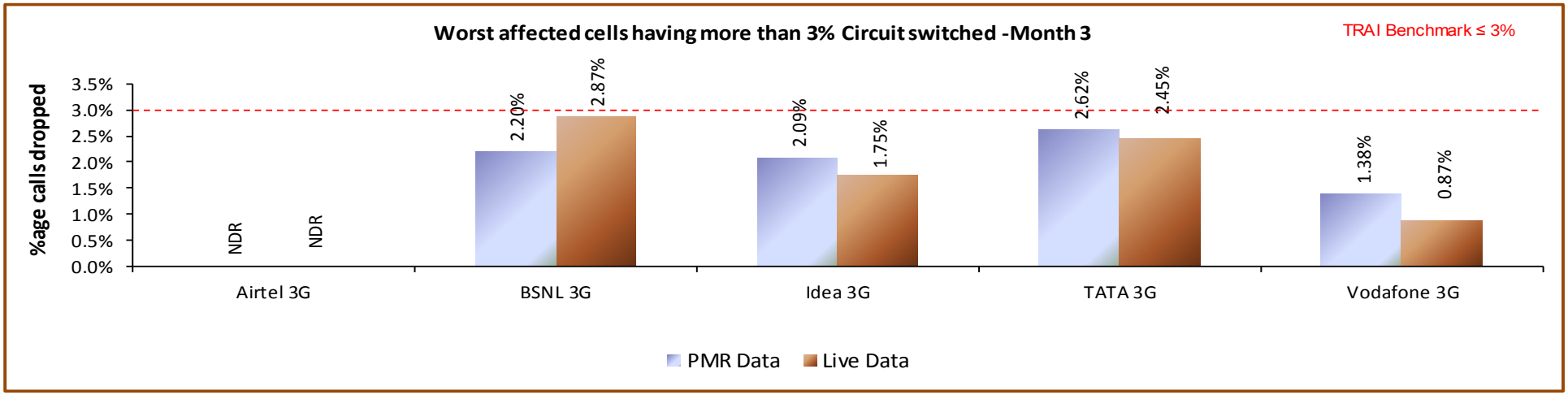
Data Source: Network Operations Center(NOC) of the operators

7.6.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

7.6.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

7.7 CIRCUIT SWITCH VOICE QUALITY

7.7.1 PARAMETER DESCRIPTION

5. **Definition:**

   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

6. **Computational Methodology:**

   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

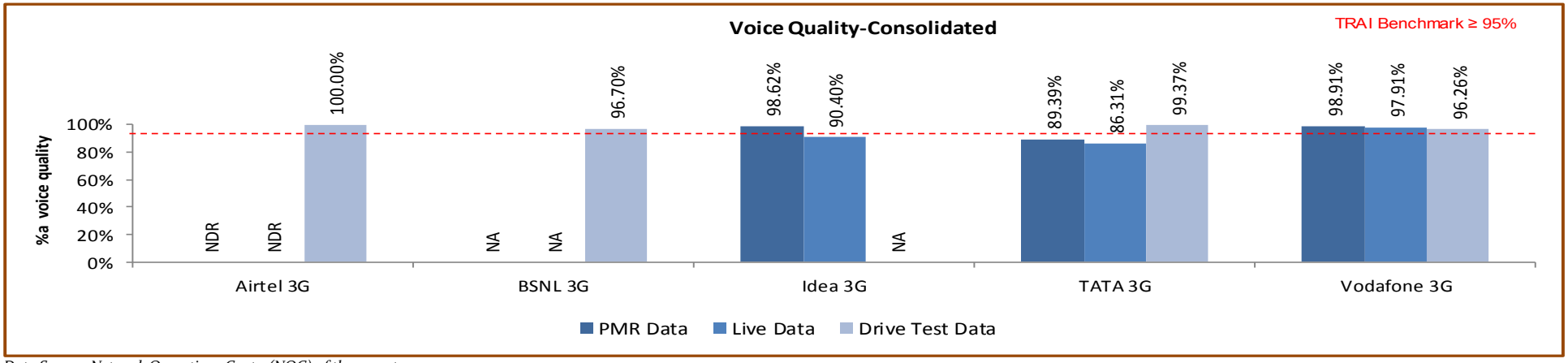
7. **TRAI Benchmark:≥** 95%

8. **Audit Procedure –**

   a. A sample of calls would be taken randomly from the total calls established.

   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

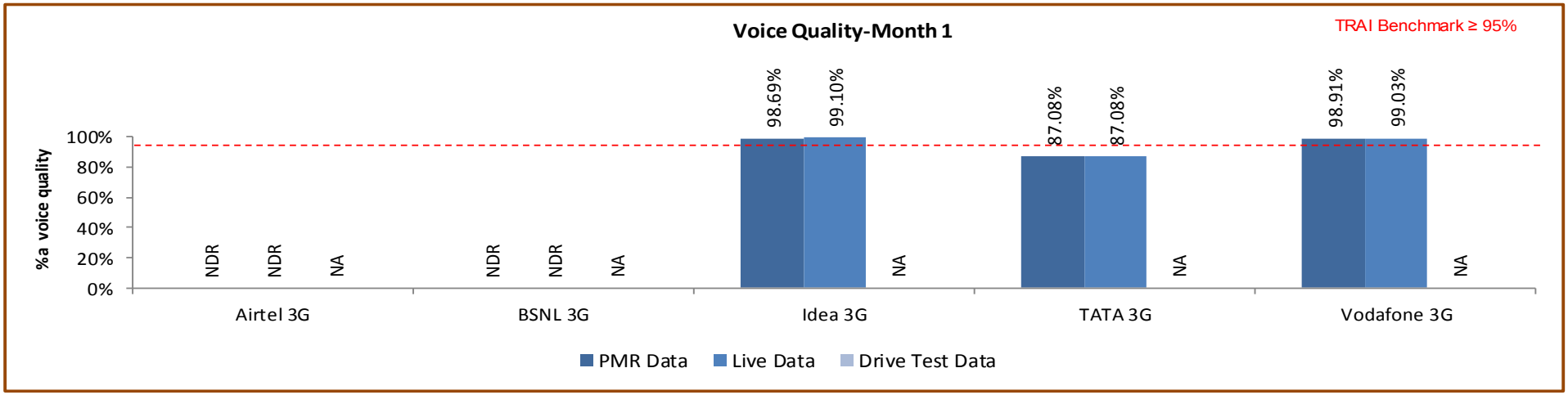
7.7.2 KEY FINDINGS



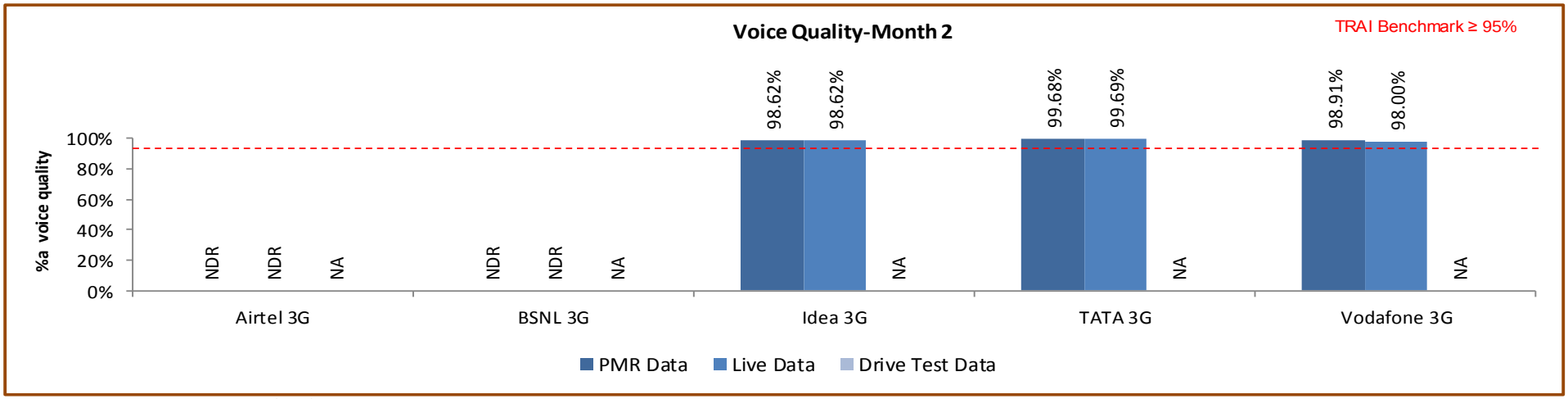
Data Source: Network Operations Center(NOC) of the operators

Idea and TATA failed met the benchmark in live audit.

7.7.2.1 KEY FINDINGS – MONTH 1

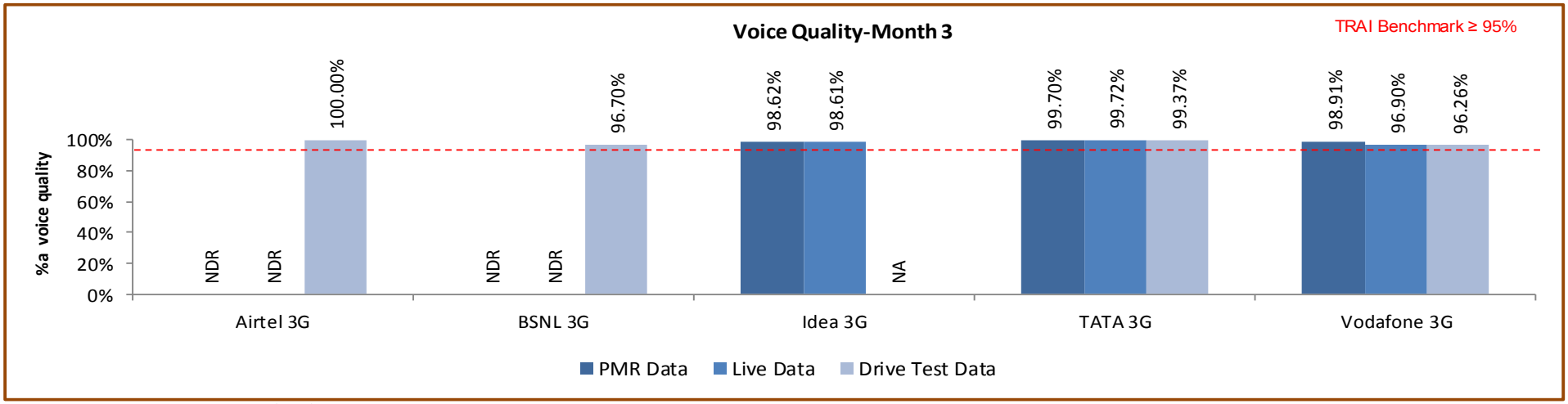


7.7.2.2 KEY FINDINGS – MONTH 2



Data Source: Network Operations Center(NOC) of the operators

7.7.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center(NOC) of the operators

8 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G)

8.1 JANUARY

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made											
Total Time Taken for Activation											
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PDP Context activation success rate											
No. of data Session requested				847407386							
No. of data Session Successful				830062584							
PDP Context activation success rate	≥ 95%	NA	NA	97.95%	NA	NA	NA	NA	NA	NA	NA
Drop Rate											
No. of Successful data calls		39208944680		87675466							
No. of Dropped data Calls		287221010		2513360							
% Drop rate	≤ 5%	0.73%	NA	2.87%	NA	NA	NA	NA	NA	NA	NA
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made											
Total Time Taken for Activation											
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PDP Context activation success rate											
No. of data Session requested											
No. of data Session Successful											
PDP Context activation success rate	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drop Rate											
No. of Successful data calls		4010707918									
No. of Dropped data Calls		31500779									
Drop rate	≤ 5%	0.79%	NA	NA	NA	NA	NA	NA	NA	NA	NA

8.2 FEBRUARY

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made		431804								95148	
Total Time Taken for Activation		431809								90273	
% activation done within 4 hours	≥ 95%	100.00%	NA	NA	NA	NA	NA	NA	NA	94.88%	NA
PDP Context activation success rate											
No. of data Session requested		1157774324								1543691293	
No. of data Session Successful		1126941847								1499740039	
PDP Context activation success rate	≥ 95%	97.34%	NA	NA	NA	NA	NA	NA	NA	97.15%	NA
Drop Rate											
No. of Successful data calls		37623024951								6461731810	170944452
No. of Dropped data Calls		301717246								54341385	8157274
Drop rate	≤ 5%	0.80%	NA	NA	NA	NA	NA	NA	NA	0.84%	4.77%
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made											
Total Time Taken for Activation											
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PDP Context activation success rate											
No. of data Session requested				81078233							
No. of data Session Successful				79076622							
PDP Context activation success rate	≥ 95%	NA	NA	97.53%	NA	NA	NA	NA	NA	NA	NA
Drop Rate											
No. of Successful data calls		4010707918		8320720							
No. of Dropped data Calls		31500779		239925							
Drop rate	≤ 5%	0.79%	NA	2.88%	NA	NA	NA	NA	NA	NA	NA

8.3 MARCH

Wireless Data-PMR											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made											
Total Time Taken for Activation											
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PDP Context activation success rate											
No. of data Session requested											
No. of data Session Successful											
PDP Context activation success rate	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drop Rate											
No. of Successful data calls											158008475
No. of Dropped data Calls											7378218
Drop rate	≤ 5%	NA	NA	NA	NA	NA	NA	NA	NA	NA	4.67%
Wireless Data-Live Data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Activation done within 4 hours											
Total request time made										12730	
Total Time Taken for Activation										12412	
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	97.50%	NA
PDP Context activation success rate											
No. of data Session requested		119498866								143374317	
No. of data Session Successful		115021262								142697341	
PDP Context activation success rate	≥ 95%	96.25%	NA	NA	NA	NA	NA	NA	NA	99.53%	NA
Drop Rate											
No. of Successful data calls		1211912858								640973875	
No. of Dropped data Calls		10239218								4563971	
Drop rate	≤ 5%	0.84%	NA	NA	NA	NA	NA	NA	NA	0.71%	NA

9 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (3G)

9.1 JANUARY

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NA	NA	NA	NA	NA
PDP Context activation success rate						
No. of data Session requested			847407386			
No. of data Session Successful			830062584			
PDP Context activation success rate	≥ 95%	NDR	97.95%	NA	NDR	NDR
Drop Rate						
No. of Successful data calls			2448966861			
No. of Dropped data Calls			60245904			
% Drop rate	≤ 5%	NDR	2.46%	NA	NDR	NDR
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested						
No. of data Session Successful						
PDP Context activation success rate	≥ 95%	NDR	NA	NA	NDR	NDR
Drop Rate						
No. of Successful data calls						
No. of Dropped data Calls						
Drop rate	≤ 5%	NDR	NA	NA	NDR	NDR

9.2 FEBRUARY

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested						
No. of data Session Successful						
PDP Context activation success rate	≥ 95%	NDR	NA	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls					303300553	1307208528
No. of Dropped data Calls					10983686	6917027
Drop rate	≤ 5%	NDR	NA	NDR	3.62%	0.53%
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested			81078233			
No. of data Session Successful			79076622			
PDP Context activation success rate	≥ 95%	NDR	97.53%	NA	NDR	NDR
Drop Rate						
No. of Successful data calls			232205429			
No. of Dropped data Calls			5950295			
Drop rate	≤ 5%	NDR	2.56%	NA	NDR	NDR

9.3 MARCH

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested						
No. of data Session Successful						
PDP Context activation success rate	≥ 95%	NDR	NA	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls						1415193860
No. of Dropped data Calls						7650260
Drop rate	≤ 5%	NDR	NA	NDR	NDR	0.54%
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Activation done within 4 hours						
Total request time made						
Total Time Taken for Activation						
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested						
No. of data Session Successful						
PDP Context activation success rate	≥ 95%	NDR	NA	NDR	NDR	NDR
Drop Rate						
No. of Successful data calls						
No. of Dropped data Calls						
Drop rate	≤ 5%	NDR	NA	NDR	NDR	NDR

10 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

10.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

10.1.1 PARAMETER DESCRIPTION

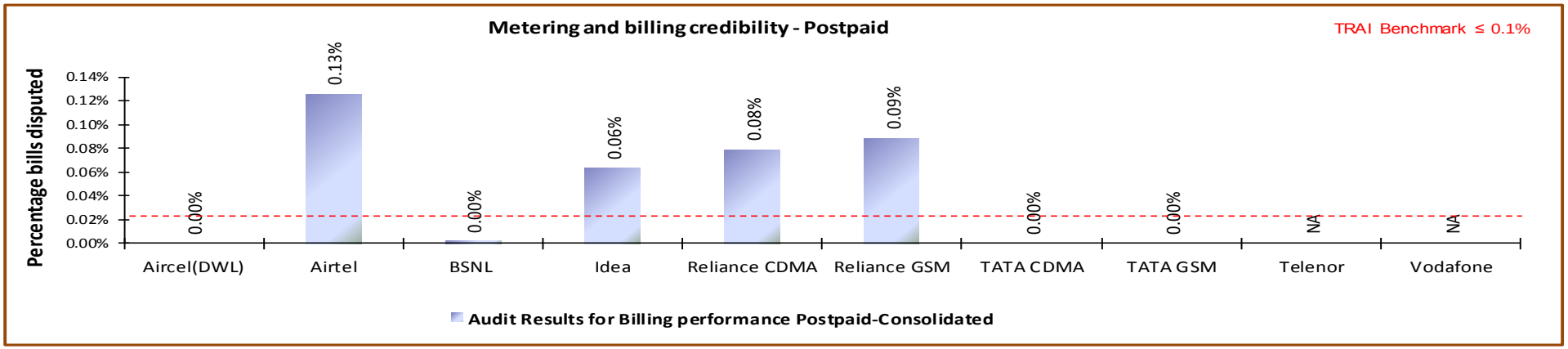
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20thDecember, 2009 were covered. The types of billing complaints covered are listed below.

- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly
- Wrong roaming charges
- Double charges
- Charging for toll free services
- Local calls charged/billed as STD/ISD or vice versa
- Calls or messages made disputed
- Validity related complaints
- Credit agreed to be given in resolution of complaint, but not accounted in the bill
- Charging for services provided without consent
- Charging not as per tariff plans or top up vouchers/ special packs etc.
- Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

- Computational Methodology:
  - **Billing complaints per 100 bills issued (Post-paid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
  - **Billing complaints here shall include only dispute related issues (including those that February arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
  - **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

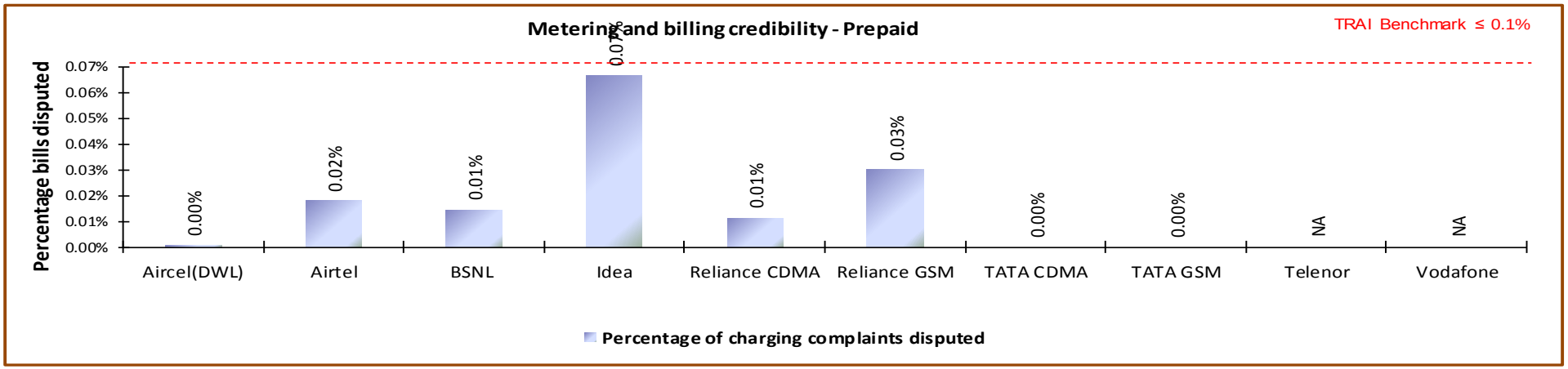
10.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

Airtel failed to meet the benchmark of 0.1% post-paid metering and billing credibility.

10.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

All operators met the benchmark for metering and billing credibility of prepaid subscribers.

10.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

10.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to -calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

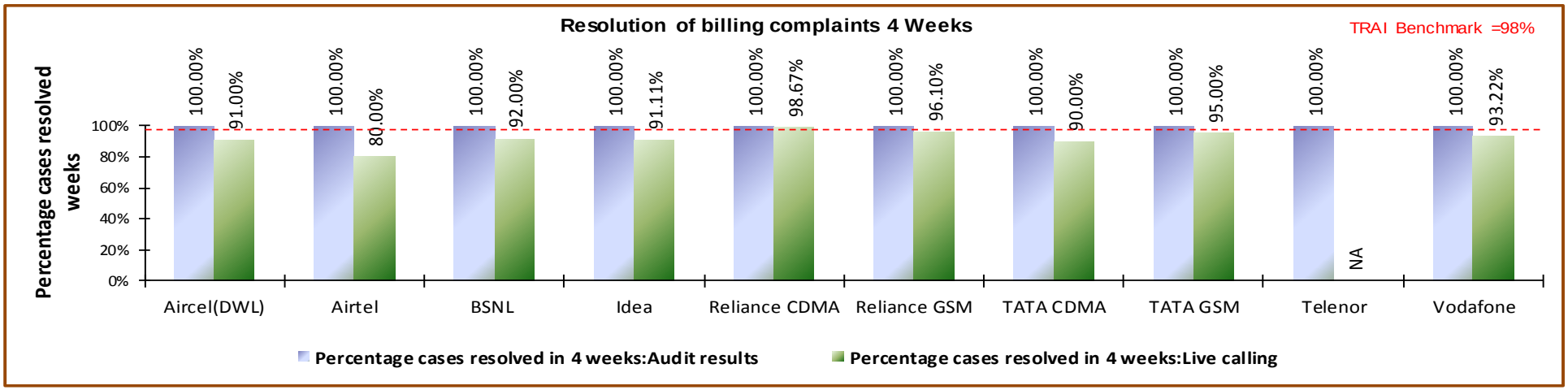
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **Billing complaints here shall include only dispute related issues (including those that February arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

- The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

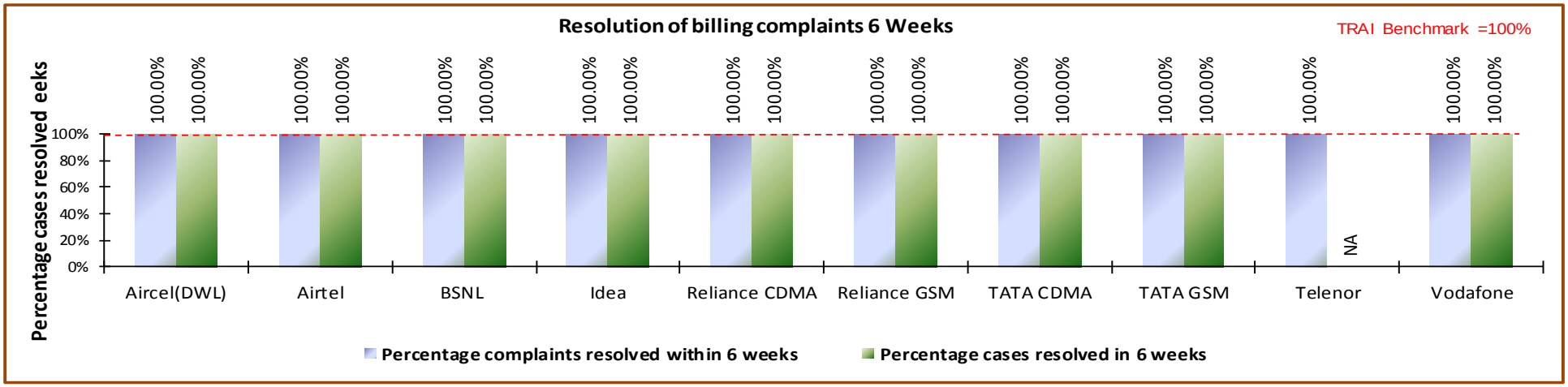
10.2.2 KEY FINDINGS- WITHIN 4 WEEKS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data in which Airtel, Aircel, BSNL, Idea, Vodafone and TATA CDMA failed to meet the benchmark.

10.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

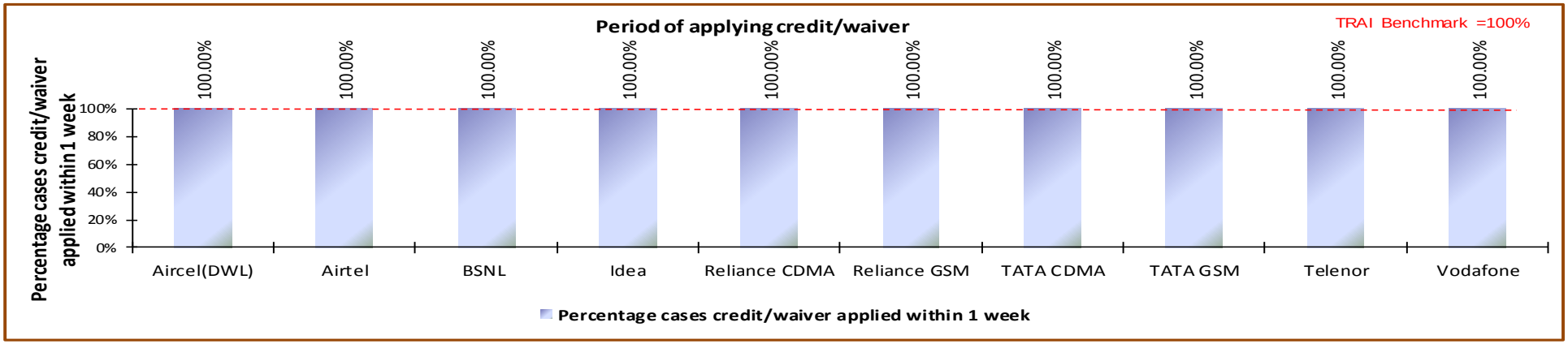
All operators met the TRAI benchmark of resolution of billing complaints within 6 weeks.

10.3 PERIOD OF APPLYING CREDIT/WAVIER

10.3.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**
- TRAI Benchmark:
  - Period of applying credit waiver within 7 days: 100%
- Audit Procedure:
  - Operator to provide details of:-
    - List of all eligible cases along with
      - Date of applying credit waiver to all the eligible cases.
      - Date of resolution of complaint for all eligible cases

10.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

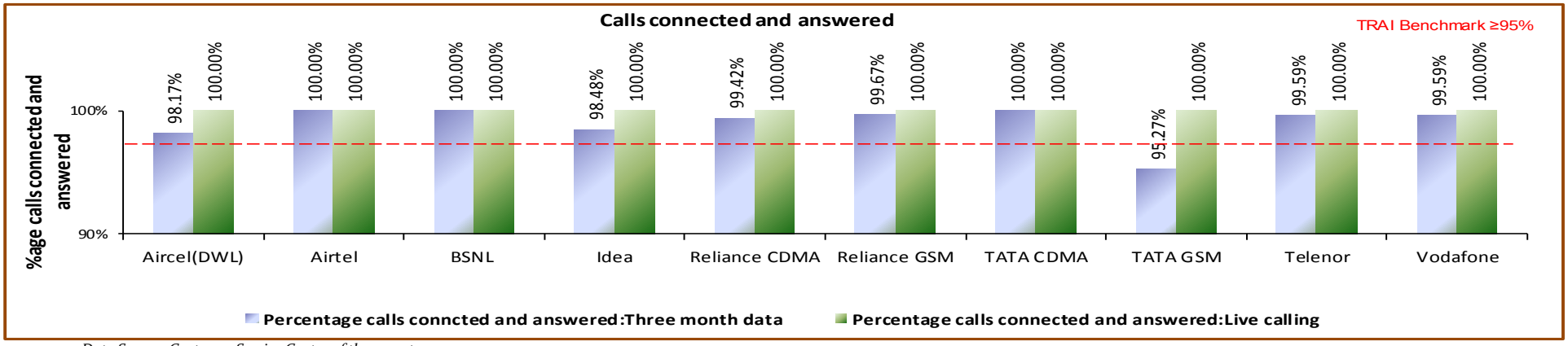
All operators met the benchmark for this parameter.

10.4 CALL CENTRE PERFORMANCE-IVR

10.4.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) * 100**
- TRAI Benchmark: >= 95%
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by IVR
    - Total calls attempted to IVR
  - Also live calling is done to test the calls connected and answered by IVR

10.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark.

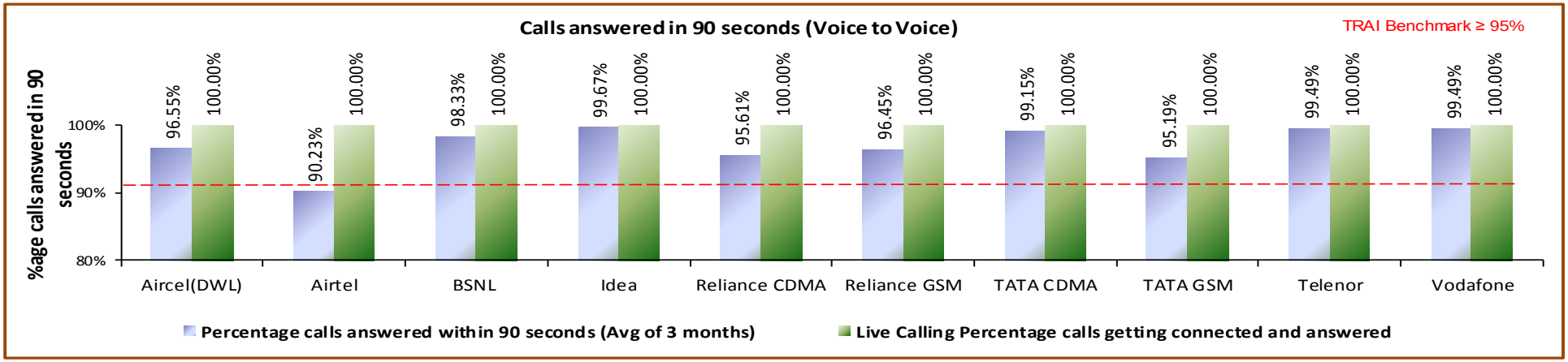
10.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

10.5.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by operator within 90 seconds
    - Total calls attempted to connect to the operator
  - Also live calling was done to test the calls answered within 90 seconds by the operator

Benchmark: 95% calls to be answered within 90 seconds

10.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

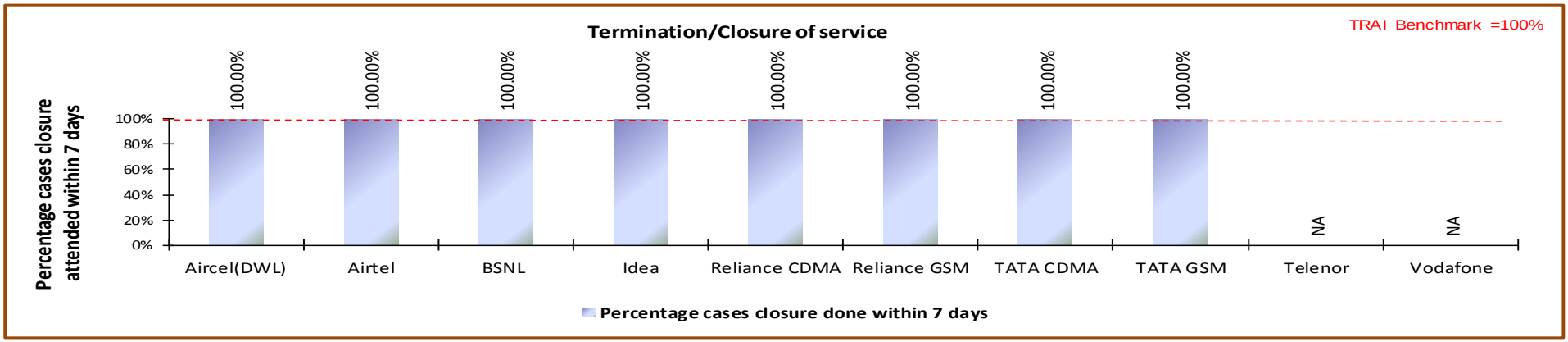
Airtel was not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance was good for all the operators except Vodafone.

10.6 TERMINATION/CLOSURE OF SERVICE

10.6.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**
- TRAI Benchmark:
  - Termination/Closure of Service: <=7 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/CS database:
    - Date of lodging the closure request (all requests in given period)
    - Date of closure of service

10.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

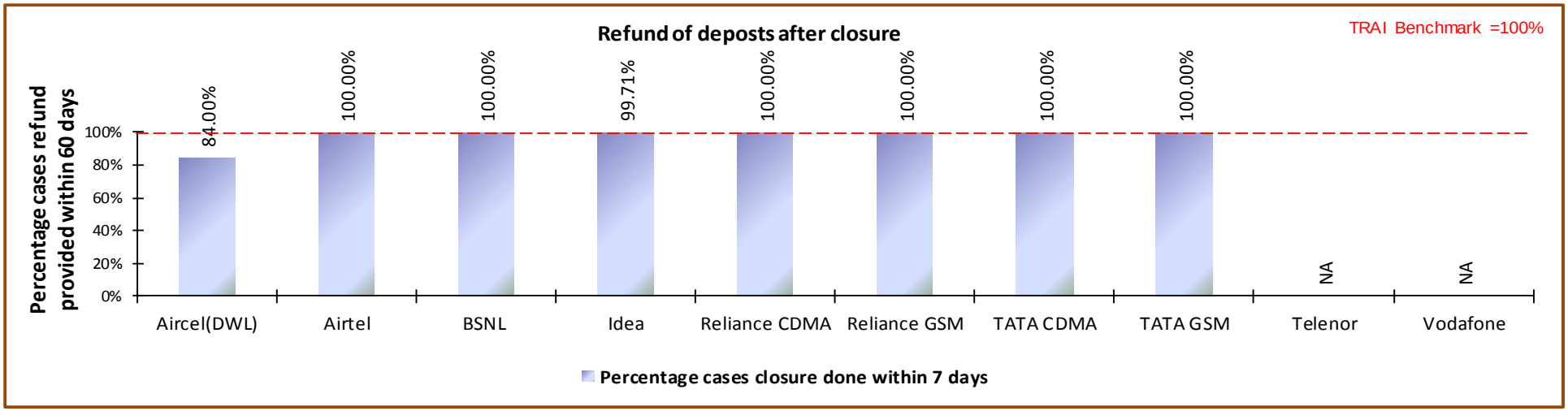
All operators met the TRAI benchmark for the parameter.

10.7 REFUND OF DEPOSITS AFTER CLOSURE

10.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**
  - Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.
- TRAI Benchmark:
  - Time taken for refund for deposit after closures: 100% within 60 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/refund database:
    - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
    - Dates of refund pertaining to all closure request received during the relevant quarter

10.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel failed to meet the TRAI benchmark for the parameter.

11 DETAILED FINDINGS - DRIVE TEST DATA

11.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the Maharashtra & Goa circle. As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days.The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

The schedule and operators involved in the operator assisted drive test for Maharashtra & Goa circle are given below.

2G	3G
Name of Operator	Name of Operator
Aircel(DWL)	Airtel
Airtel	BSNL
BSNL	Idea
Idea	TATA WCDMA
Reliance CDMA	Vodafone
Reliance GSM	
TATA CDMA	
TATA GSM	
Telenor	
Vodafone	

11.1.1 AHMEDNARGAR SSA

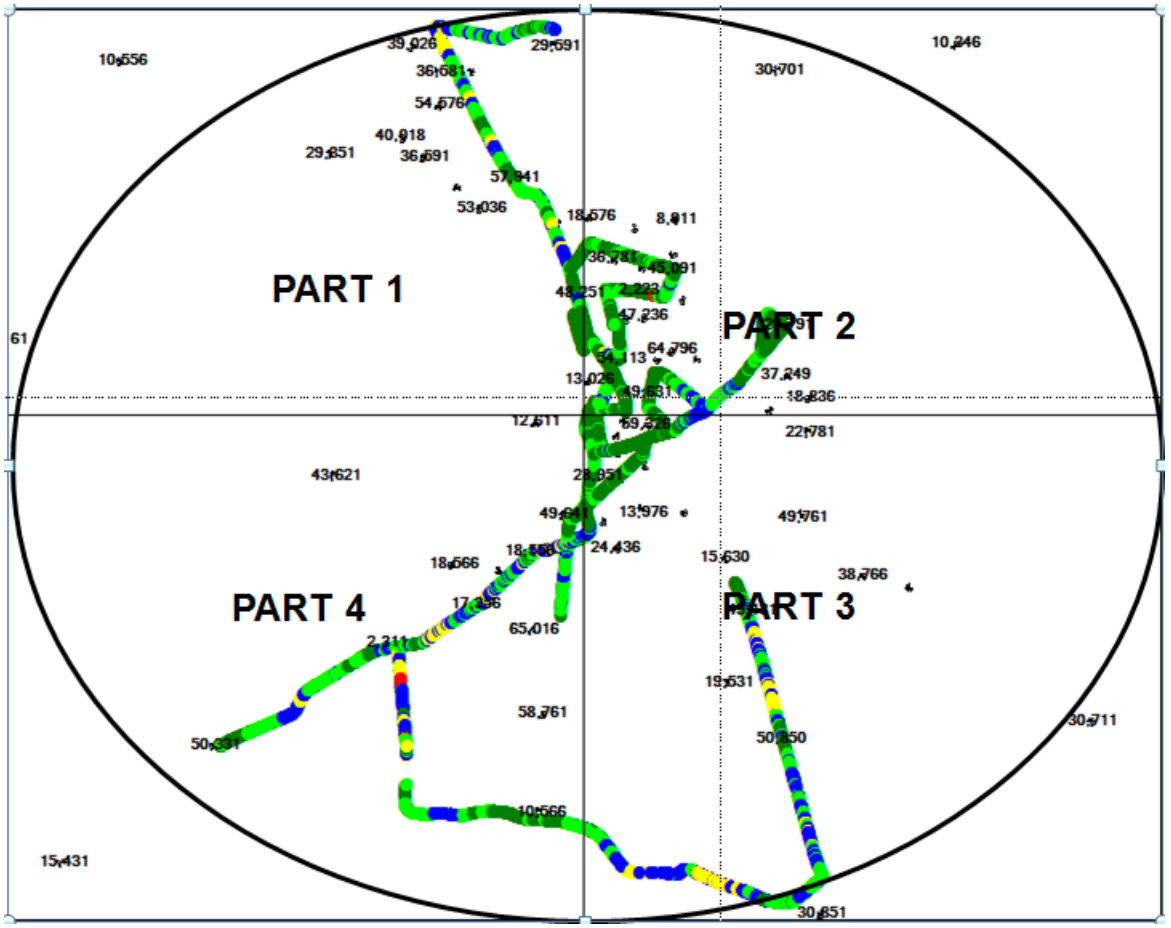
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Ahmednagar	21/03/2016	23/03/2016	321

11.1.1.1 Route Details - AHMEDNARGAR SSA

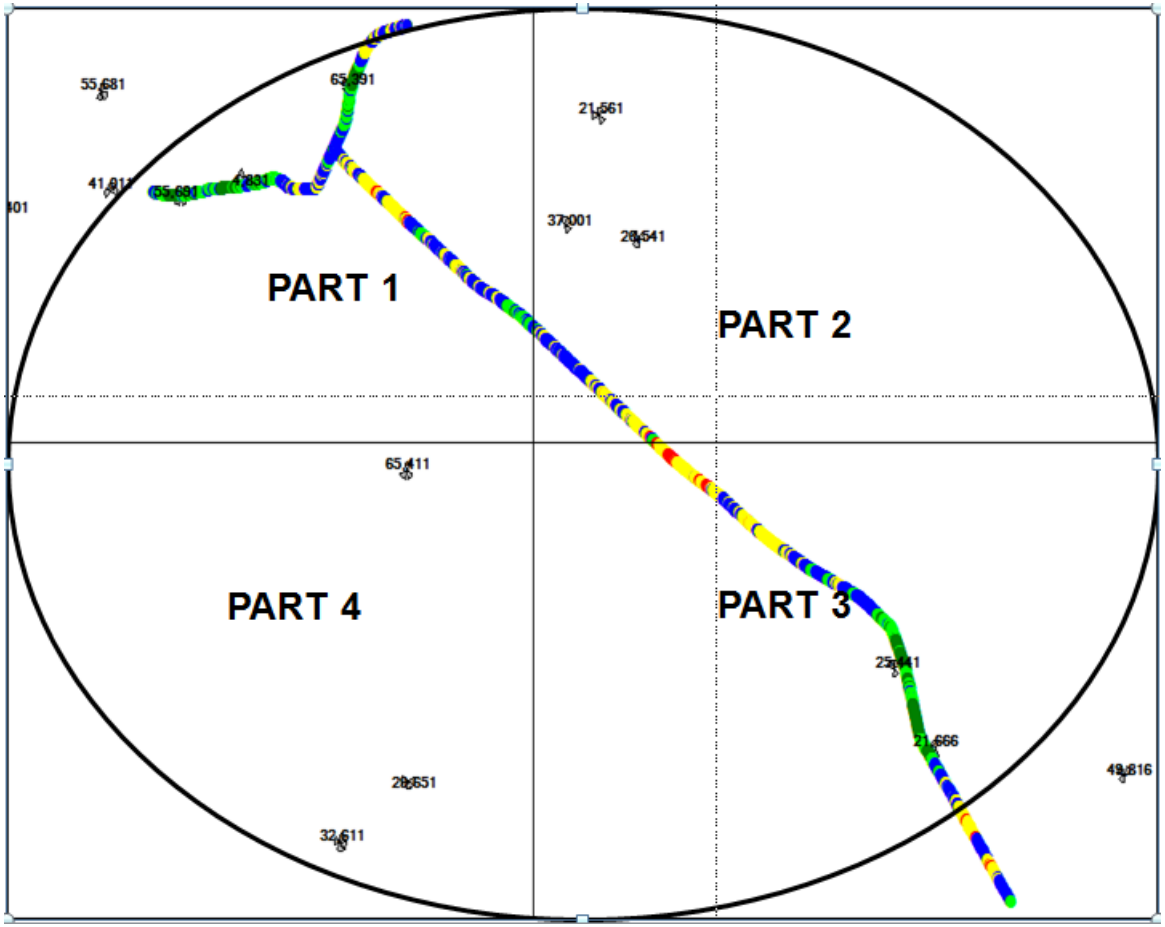
Category	Type of location	March		
		Ahmednagar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Ahmednagar within City-, Major roads in Ahmednagar City, Highway nearby Ahmednagar city, Shanishinganapur near Ahmednagar	Sangamner City Nasik-Pune Highway, Sangamner Nagar Major Road , Kolhar-Loni Highway ,Nagar Rahuri Major Road Rahuri within city.	Shrirampur within city, agar Shrirampur Major roard,Shrirampur –Newasa Highway & Shirdi Nagar Highway ,Rahata Shirdi Major Road,Kopergaon within city .
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

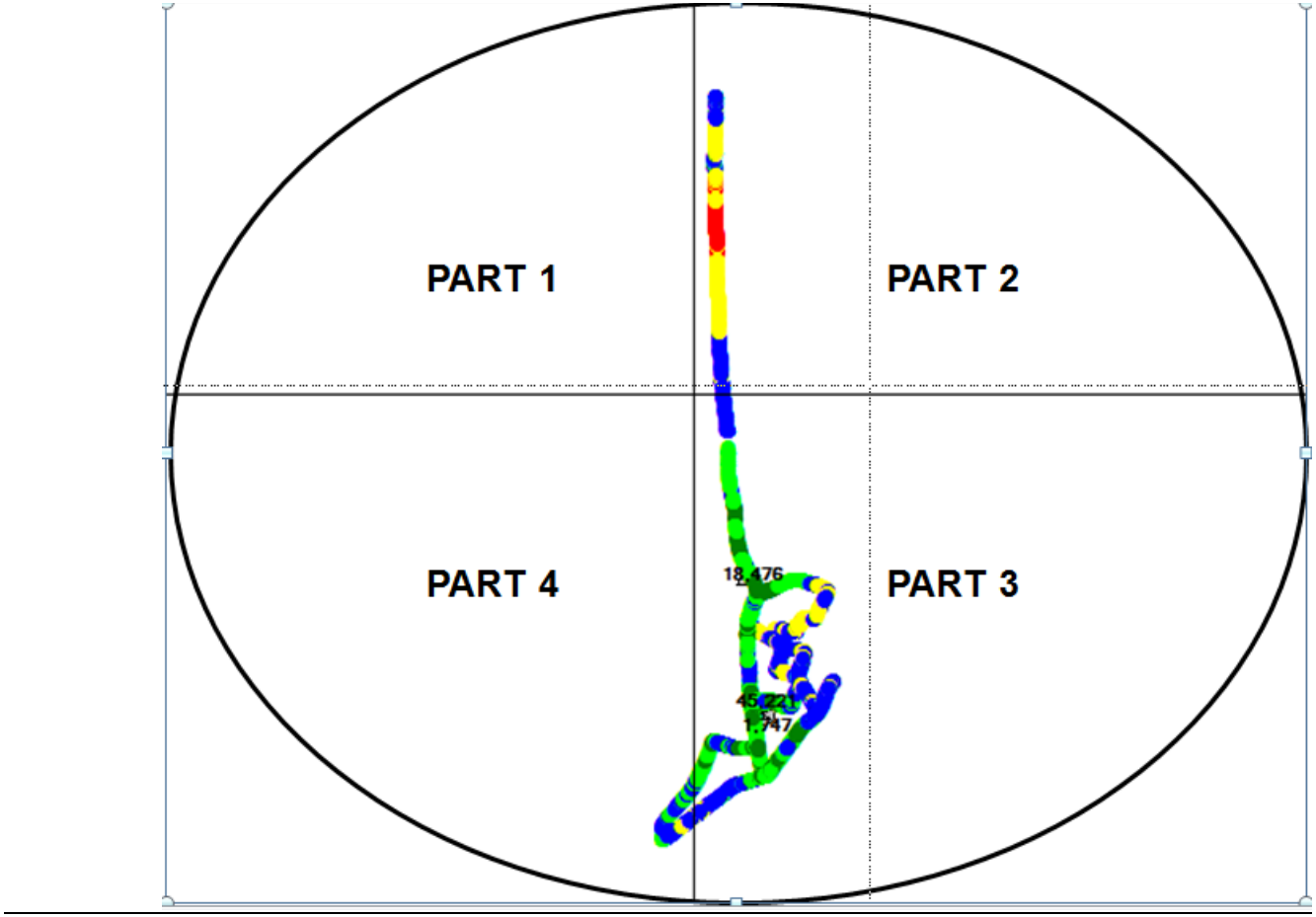
11.1.1.1 Route Map - AHMEDNARGAR DAY 1



11.1.1.2 Route Map - AHMEDNARGAR DAY 2



11.1.1.3 Route Map - AHMEDNARGAR DAY 3



11.1.1.4 Drive Test Results - AHMEDNARGAR SSA-2G

Ahmednagar	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.77%	82.72%	88.58%	54.20%	57.25%	40.99%	100.00%	82.41%	56.50%	46.78%	42.52%	27.74%	100.00%	99.97%	99.04%	92.00%	100.00%	77.12%	100.00%	77.23%
0 to -85 dBm		100.00%	96.44%	99.88%	84.21%	95.94%	82.90%	100.00%	96.91%	58.08%	74.81%	65.35%	60.79%	100.00%	99.99%	100.00%	99.24%	100.00%	94.42%	100.00%	95.48%
0 to -95 dBm		100.00%	99.81%	100.00%	97.54%	99.37%	94.89%	100.00%	99.64%	99.43%	94.60%	98.02%	89.69%	100.00%	100.00%	100.00%	100.00%	100.00%	99.76%	100.00%	99.43%
Voice quality	≥ 95%	98.99%	95.25%	99.25%	96.23%	95.20%	91.85%	99.26%	96.01%	99.54%	98.56%	96.79%	92.57%	99.64%	98.29%	99.95%	96.76%	99.38%	94.98%	99.34%	96.80%
CSSR	≥ 95%	100.00%	97.45%	100.00%	99.69%	96.81%	96.20%	100.00%	99.77%	95.52%	99.12%	98.44%	98.14%	100.00%	100.00%	100.00%	99.33%	100.00%	100.00%	100.00%	99.30%
%age Blocked calls		0.00%	2.30%	0.00%	0.31%	3.19%	3.80%	0.00%	0.23%	4.48%	0.88%	1.56%	1.86%	0.00%	0.00%	0.00%	0.67%	0.00%	0.00%	0.00%	0.70%
Call drop rate	≤ 2%	0.00%	1.04%	0.00%	0.00%	0.00%	1.51%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.37%	0.00%	0.45%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	98.29%	100.00%	100.00%	100.00%	96.45%	100.00%	100.00%	100.00%	100.00%	100.00%	99.50%	100.00%	100.00%	100.00%	99.68%	100.00%	98.88%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL, Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

All operators met the benchmark of call drop rate.

11.1.1.5 Drive Test Results - AHMEDNARGAR SSA-3G

Ahmednagar	B'mark	Airtel		BSNL		Idea		TATA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	100.00%	16.78%	8.65%	94.32%	31.43%	100.00%	95.11%	81.49%	29.62%
0 to -85 dBm		100.00%	100.00%	91.20%	49.27%	100.00%	69.48%	100.00%	99.08%	99.93%	60.79%
0 to -95 dBm		100.00%	100.00%	99.18%	81.82%	100.00%	92.23%	100.00%	100.00%	100.00%	84.52%
Voice quality	≥ 95%	100.00%	100.00%	98.79%	98.65%	NDR	NDR	100.00%	99.10%	99.89%	96.55%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.57%	100.00%	99.74%
%age Blocked calls		0.00%	0.86%	1.27%	3.55%	0.00%	0.00%	0.00%	0.43%	0.00%	0.26%
Call drop rate	≤ 2%	0.00%	0.86%	0.00%	2.48%	0.00%	0.00%	0.00%	0.43%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	96.36%	100.00%	100.00%	100.00%	99.59%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

BSNL 3G met the benchmark for call drop rate in outdoor locations.

11.1.1.6 Data Drive Test Results - AHMEDNARGAR SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100	100	100
Minimum download speed		96	104	31	109	73	72	2195	119	109	131
Average throughput for Packet Data		112	125	46	146	85	82	2907	191	141	157
Latency	<250ms	100	100	100	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

11.1.1.7 Data Drive Test Results - AHMEDNARGAR SSA-3G

Name of the Parameter	Bench Mark	Aircel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	No Service	100	100	NDR	100
Succesful Data Transmission upload speed attempts	>75%		100	100	NDR	100
Minimum download speed			2971	1047	NDR	2617
Average throughput for Packet Data			3310	2083	NDR	3368
Latency	<250ms		100	100	NDR	100

Note: TATA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.2 SATARA SSA

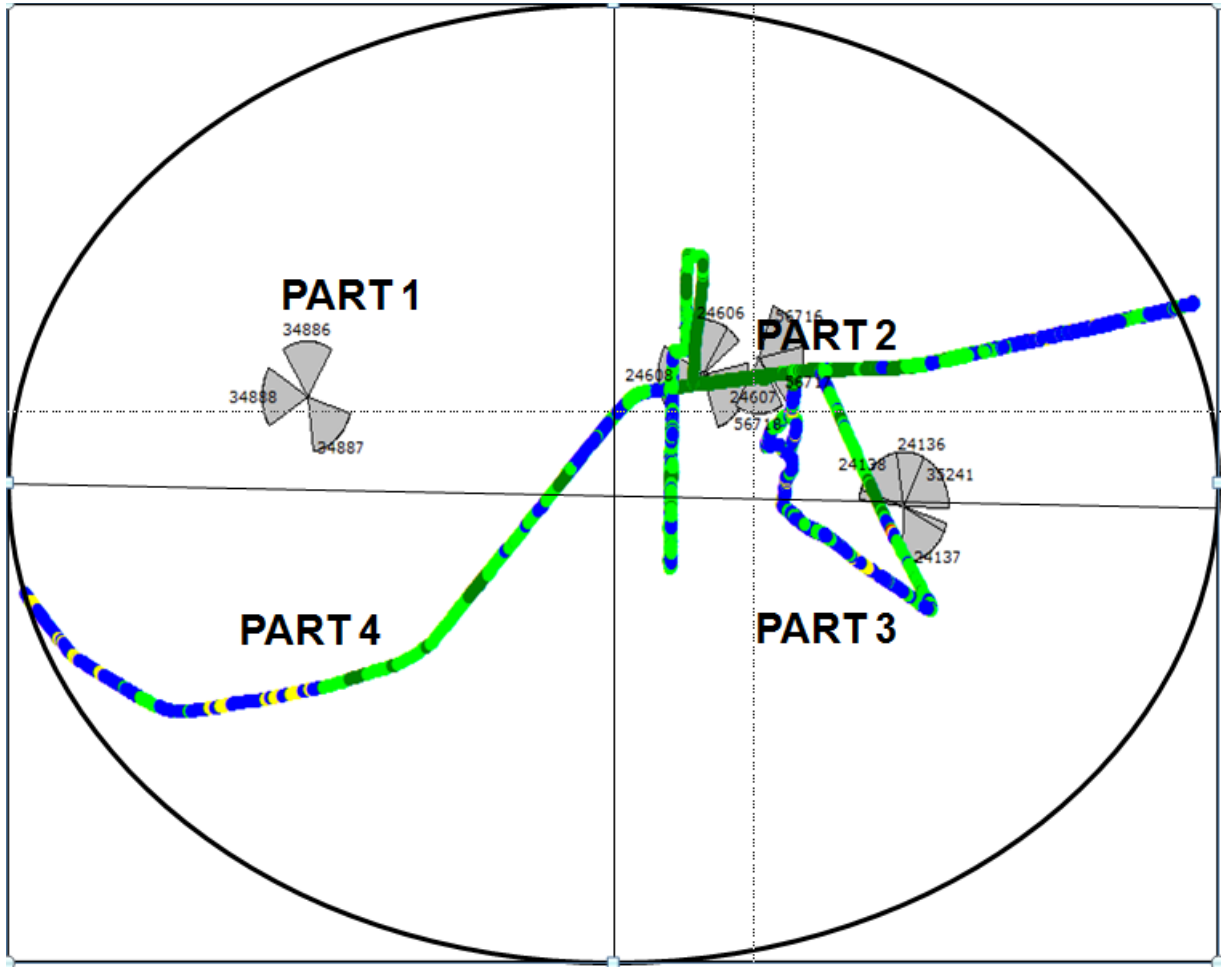
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
February - March	Satara	29-02-2016	02-03-2016	306

11.1.2.1 Route Details - SATARA SSA

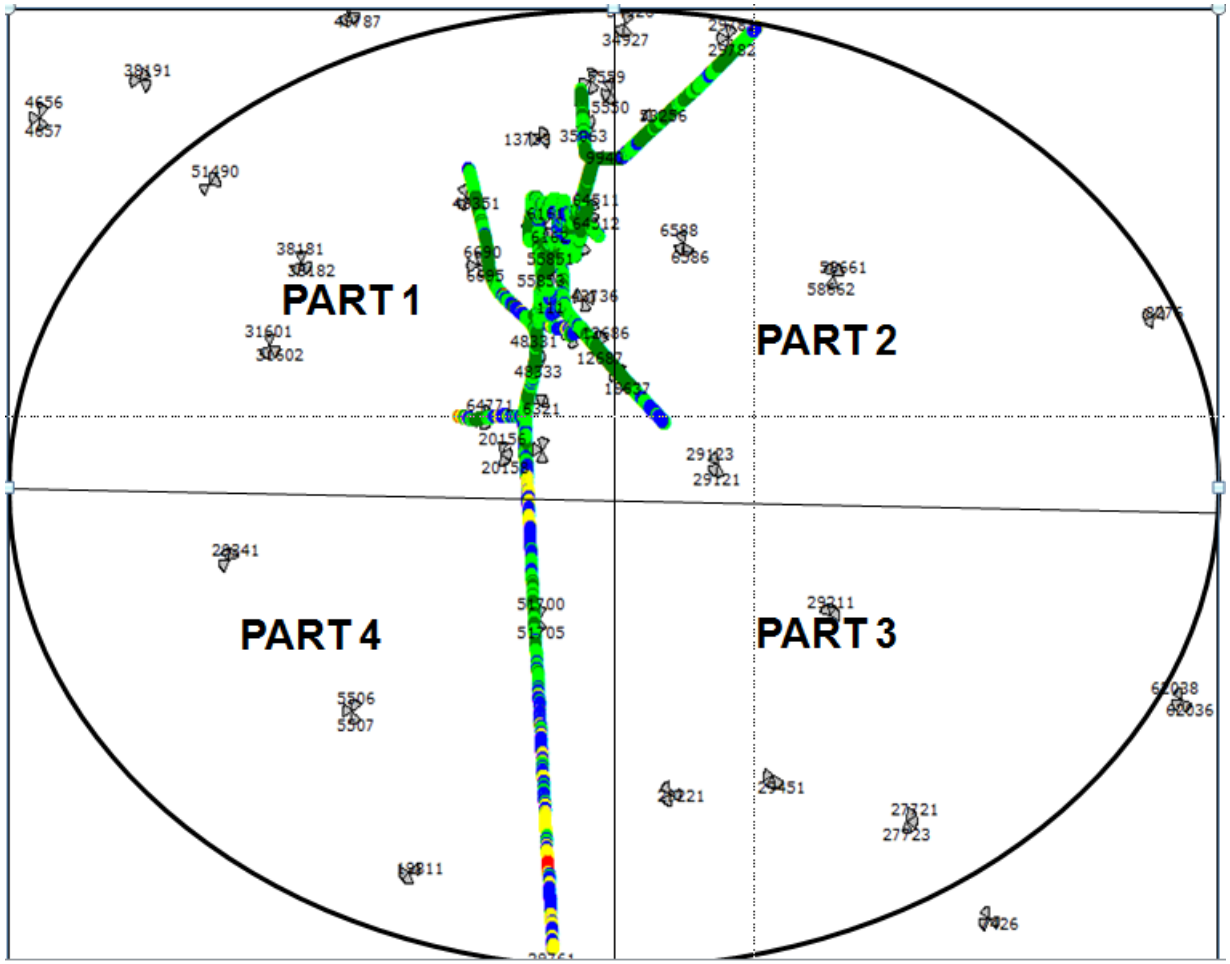
Category	Type of location	February - March		
		Satara		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Satara within City-, Major roads in Satara City,Highway nearby Satara city.	Karad within City-, Major roads in Karad City,Highway nearby Karad city.Patan within City-, Major roads in Patan City,Highway nearby Patan city.	Wai within city, Wai & Panchgani Major roards,Wai & Panchgani nearby Highway & Mahableshwar-within city ,Major roads,highway/83 Km
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

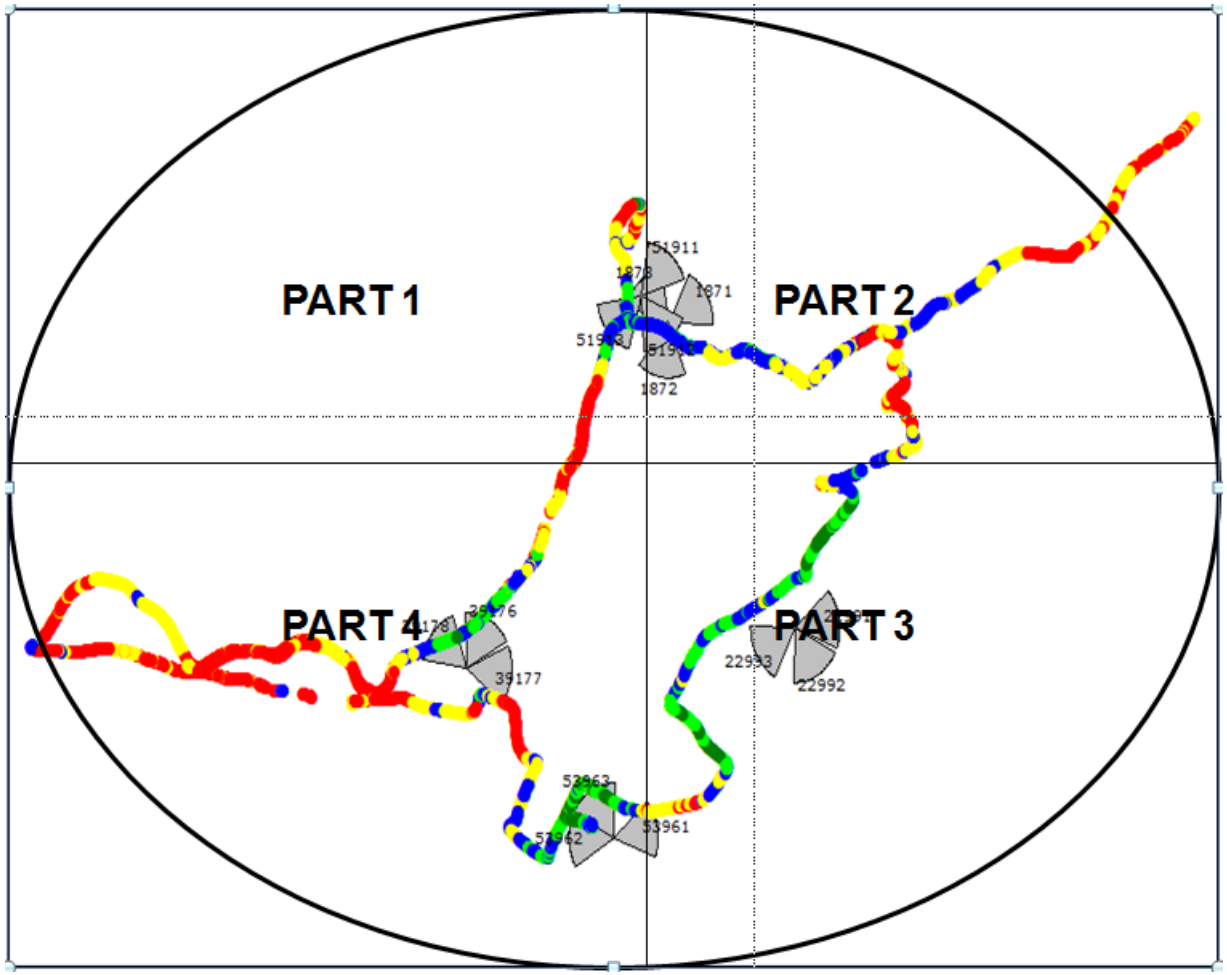
11.1.2.2 Route Map - SATARA DAY 1



11.1.2.3 Route Map - SATARA DAY 2



11.1.2.4 Route Map - SATARA DAY 3



11.1.2.5 Drive Test Results - SATARA SSA-2G

Satara	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		90.45%	63.00%	84.98%	57.57%	53.91%	72.35%	96.60%	84.48%	99.97%	56.29%	58.07%	21.84%	100.00%	99.98%	98.07%	93.19%	99.96%	75.79%	99.92%	67.97%
0 to -85 dBm		99.92%	89.04%	99.97%	81.09%	99.43%	97.18%	99.97%	92.45%	100.00%	85.53%	48.17%	58.31%	100.00%	100.00%	99.99%	99.31%	100.00%	93.74%	100.00%	92.04%
0 to -95 dBm		100.00%	96.35%	100.00%	93.95%	99.96%	99.74%	100.00%	99.66%	100.00%	97.85%	99.42%	88.91%	100.00%	100.00%	100.00%	100.00%	100.00%	99.31%	100.00%	99.01%
Voice quality	≥ 95%	99.70%	96.08%	99.65%	98.27%	84.38%	79.52%	99.34%	96.20%	100.00%	97.37%	82.22%	84.99%	99.66%	96.82%	99.97%	97.23%	99.22%	95.69%	99.69%	97.38%
CSSR	≥ 95%	100.00%	98.86%	100.00%	100.00%	91.76%	93.27%	100.00%	99.46%	100.00%	91.48%	98.41%	98.69%	100.00%	99.76%	100.00%	99.59%	100.00%	99.54%	100.00%	99.25%
%age Blocked calls		0.00%	1.14%	0.00%	0.00%	8.24%	6.77%	0.00%	0.27%	0.00%	1.57%	1.59%	1.31%	0.00%	0.20%	0.00%	0.41%	0.00%	0.46%	0.00%	0.75%
Call drop rate	≤ 2%	0.00%	0.19%	0.00%	0.00%	0.00%	4.28%	0.00%	0.00%	0.00%	1.47%	0.00%	0.27%	0.00%	0.20%	0.00%	0.61%	0.00%	0.23%	0.00%	0.00%
Hands off success rate		100.00%	98.61%	100.00%	100.00%	100.00%	98.61%	100.00%	99.68%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.74%	100.00%	99.33%	100.00%	99.56%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmarks of CSSR in indoor as well as outdoor, however Reliance CDMA failed in outdoor location.

Call Drop Rate

BSNL failed to meet the benchmark of call drop rate in outdoor location.

11.1.2.6 Drive Test Results - SATARA SSA-3G

Satara	B'mark	Airtel		BSNL		Idea		TATA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		77.43%	52.99%	43.33%	32.60%	99.88%	95.32%	60.28%	40.70%
0 to -85 dBm				94.69%	79.80%	75.48%	61.76%	100.00%	99.57%	99.50%	67.30%
0 to -95 dBm				100.00%	99.86%	99.52%	85.96%	100.00%	100.00%	100.00%	90.94%
Voice quality	≥ 95%			99.78%	95.61%	NDR	NDR	100.00%	99.68%	98.52%	95.02%
CSSR	≥ 95%			100.00%	95.55%	100.00%	99.18%	100.00%	99.57%	100.00%	100.00%
%age Blocked calls				0.00%	3.43%	0.00%	0.00%	0.00%	0.42%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	3.61%	0.00%	0.27%	0.00%	0.42%	0.00%	0.00%
Hands off success rate				100.00%	99.94%	100.00%	98.81%	100.00%	99.61%	100.00%	98.91%

Voice Quality

All operators met the benchmark for Voice quality.

Note: Idea 3G did not submit data for voice quality

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

BSNL 3G failed to meet the benchmark for call drop rate in outdoor locations.

11.1.2.7 Data Drive Test Results - SATARA SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	98	100	NDR	NDR	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	98	100	NDR	NDR	100	100	100	100
Minimum download speed		95	97	12	142	NDR	NDR	2441	153	106	114
Average throughput for Packet Data		100	134	40	210	NDR	NDR	3636	203	147	151
Latency	<250ms	100	100	NDR	100	NDR	NDR	100	100	100	100

Note: Reliance GSM & CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.2.8 Data Drive Test Results - SATARA SSA-3G

Name of the Parameter	Bench Mark	Aircel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	No Service	100	100	NDR	100
Succesful Data Transmission upload speed attempts	>75%		100	100	NDR	100
Minimum download speed			838	1200	NDR	2530
Average throughput for Packet Data			2310	2555	NDR	3474
Latency	<250ms		99	100	NDR	100

Note: TATA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.3 Solapur SSA

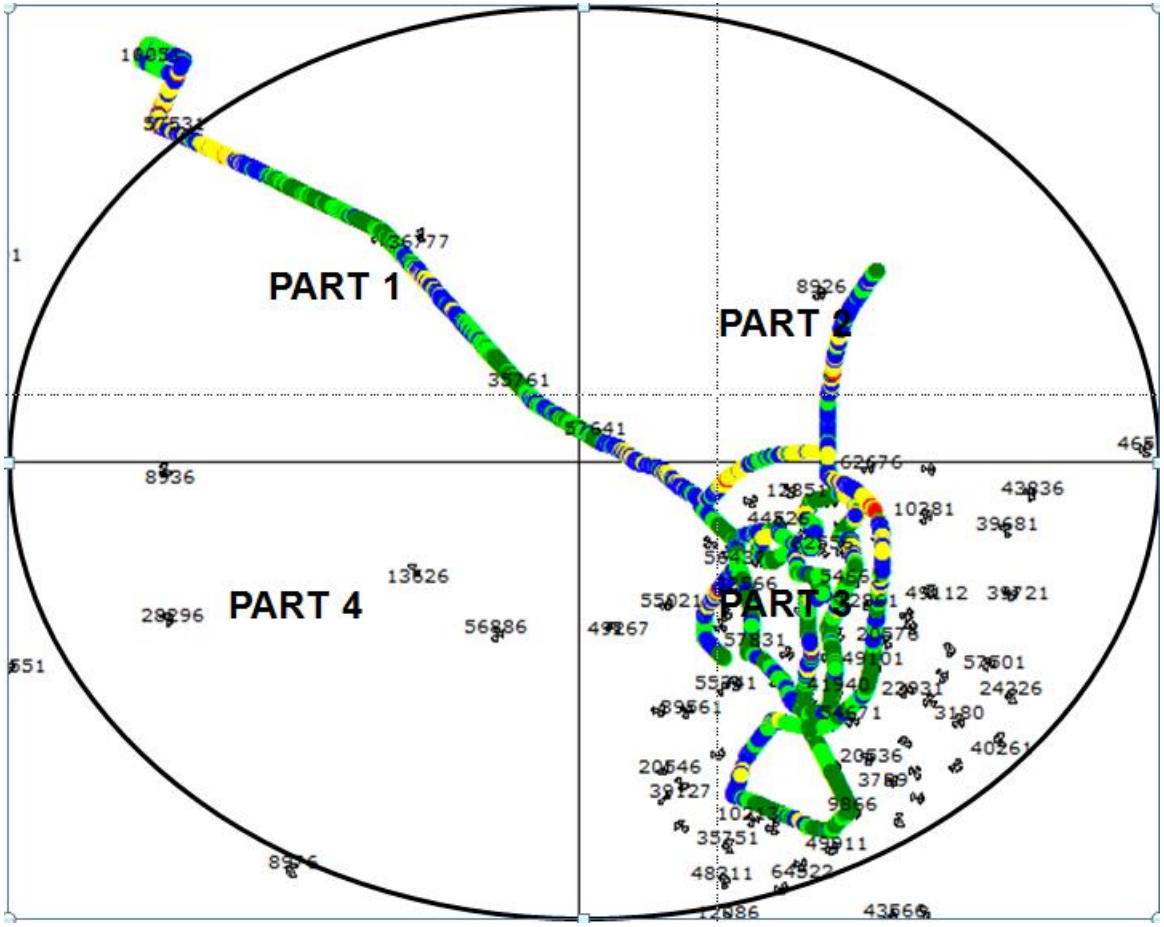
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Solapur	09-03-2016	11-03-2016	330

11.1.3.1 Route Details - Solapur SSA

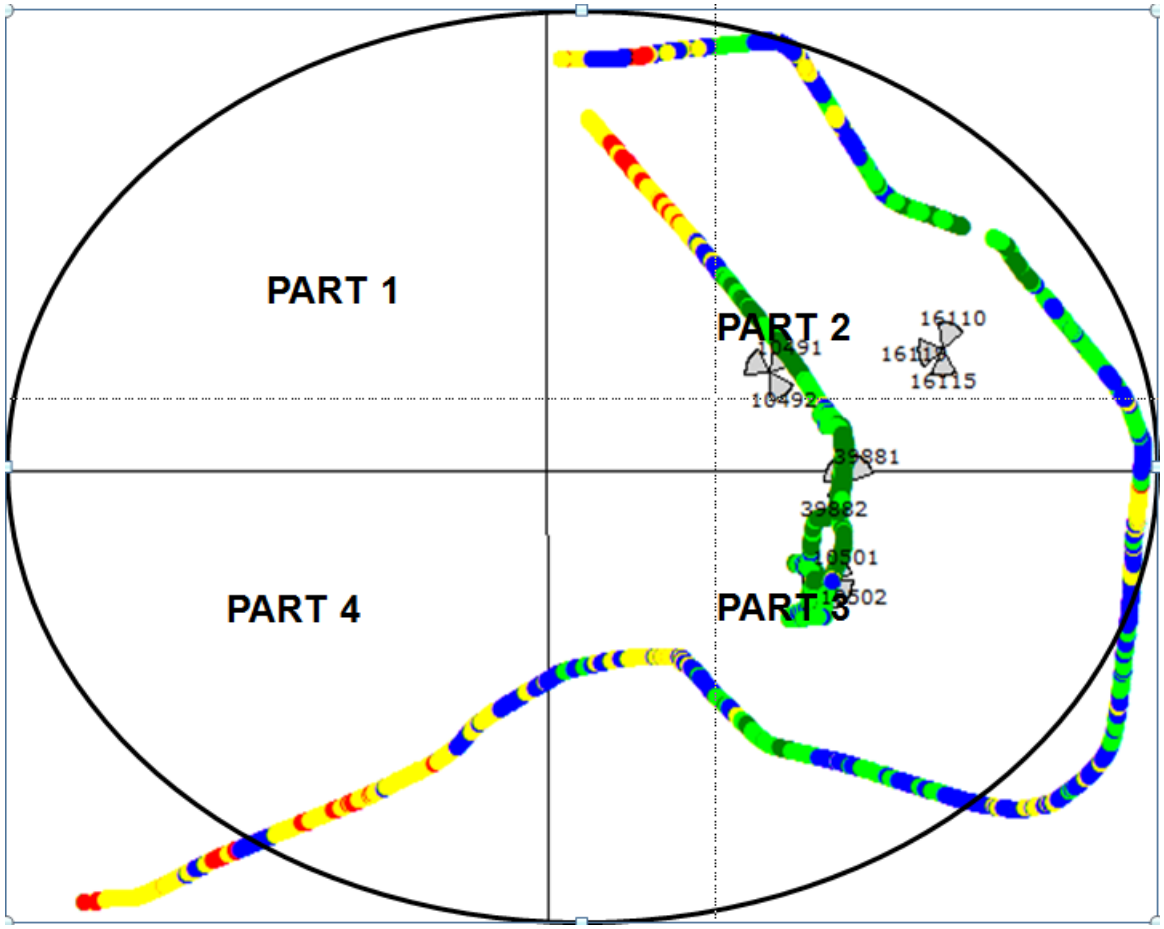
Category	Type of location	March		
		Solapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Solapur Highway, Solapur Major road, Solapur Within city, Akkalkot Highway, Akkalkot major road, Akkalkot within city	Pandharpur Highway, Pandharpur major road, Pandharpur within city, Sangola Highway, Sangola major road, Mangalvedha Highway, Mangalvedha Within city	Mohol Highway, Mohol Major road, Vairag major road, Barshi,Highway, Barshi,Major road, Barshi,within city
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

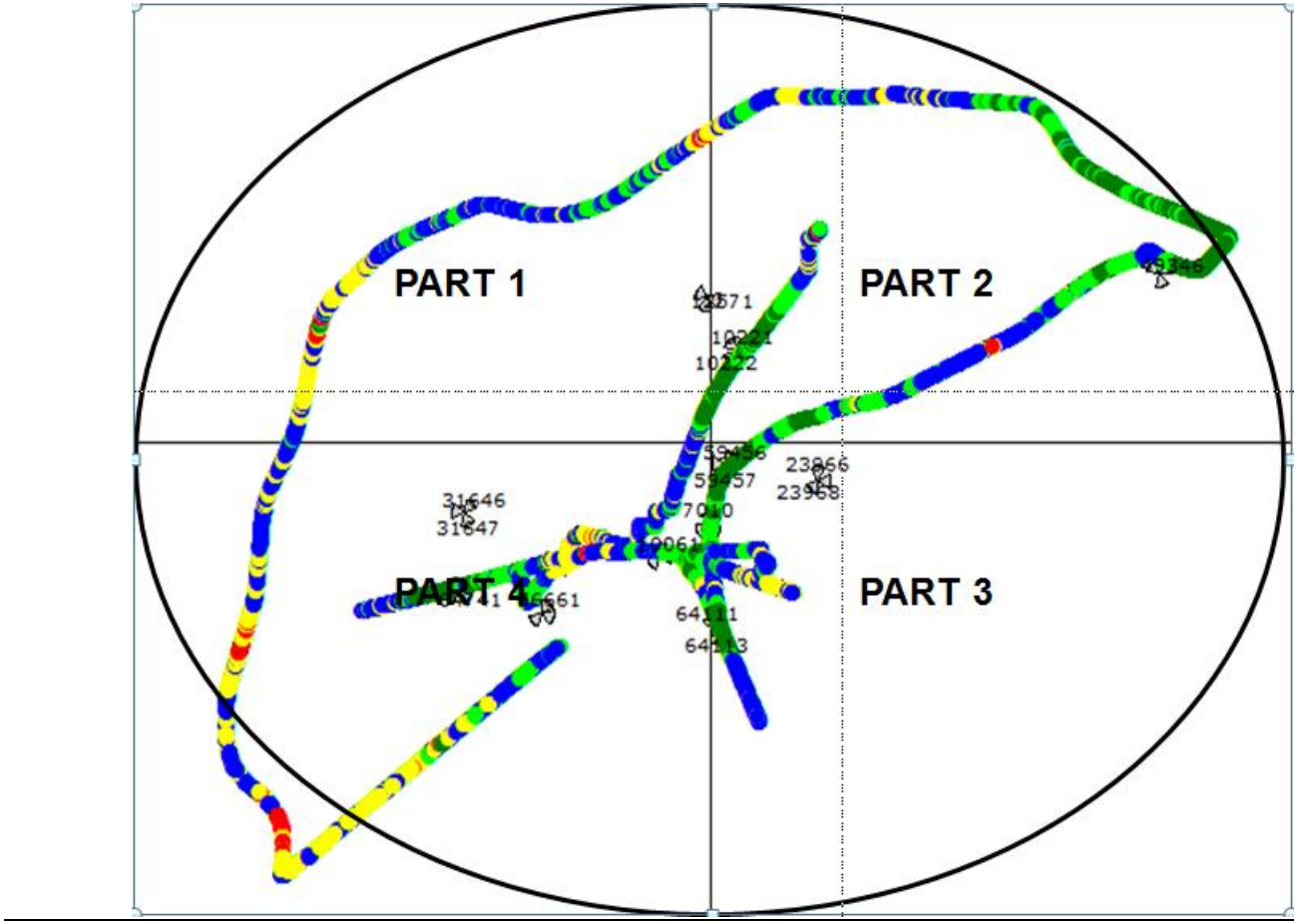
11.1.3.2 Route Map - Solapur DAY 1



11.1.3.3 Route Map - Solapur DAY 2



11.1.3.4 Route Map - Solapur DAY 3



11.1.3.5 Drive Test Results - Solapur SSA-2G

Solapur	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		53.02%	46.95%	46.27%	63.35%	100.00%	89.88%	17.04%	49.89%	80.11%	17.12%	100.00%	99.98%	97.32%	93.60%	99.13%	77.93%	100.00%	94.63%
0 to -85 dBm				67.06%	79.14%	83.52%	94.69%	100.00%	98.67%	30.18%	79.16%	91.26%	46.38%	100.00%	100.00%	99.97%	99.59%	100.00%	95.32%	100.00%	98.80%
0 to -95 dBm				98.40%	97.67%	99.99%	100.00%	100.00%	99.67%	99.00%	98.44%	97.42%	82.34%	100.00%	100.00%	100.00%	100.00%	100.00%	99.87%	100.00%	99.64%
Voice quality	≥ 95%			98.97%	97.64%	94.10%	95.24%	98.19%	96.00%	99.88%	98.32%	98.97%	91.70%	98.53%	96.86%	99.92%	97.32%	98.19%	94.74%	98.25%	95.99%
CSSR	≥ 95%			100.00%	100.00%	96.84%	96.95%	100.00%	99.77%	100.00%	98.95%	100.00%	96.85%	100.00%	100.00%	100.00%	100.00%	100.00%	99.75%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	5.26%	4.68%	0.00%	0.00%	0.00%	1.05%	0.00%	2.58%	0.00%	0.00%	0.00%	0.50%	0.00%	0.25%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	2.22%	1.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	0.29%	0.00%	0.51%	0.00%	0.00%	0.00%	0.23%
Hands off success rate				100.00%	100.00%	84.09%	98.24%	100.00%	99.31%	100.00%	100.00%	100.00%	99.78%	100.00%	100.00%	100.00%	99.67%	100.00%	99.14%	100.00%	99.47%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance GSM and Telenor failed to meet the benchmark for voice quality in outdoor, however BSNL failed in indoor locations for voice quality.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

BSNL failed to meet the benchmark of call drop rate.

11.1.3.6 Drive Test Results - Solapur SSA-3G

Solapur	B'mark	Airtel		BSNL		Idea		TATA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		76.87%	52.42%	85.13%	63.95%	NA	92.85%	100.00%	65.24%
0 to -85 dBm				94.43%	79.51%	99.98%	85.52%	NA	98.85%	100.00%	87.43%
0 to -95 dBm				98.44%	99.96%	100.00%	96.41%	NA	100.00%	100.00%	97.86%
Voice quality	≥ 95%			97.02%	95.57%	NDR	NDR	NA	97.56%	93.48%	95.83%
CSSR	≥ 95%			98.98%	98.75%	100.00%	99.71%	NA	100.00%	100.00%	99.28%
%age Blocked calls				2.44%	2.58%	0.00%	0.00%	NA	0.00%	0.00%	0.72%
Call drop rate	≤ 2%			2.47%	1.77%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Hands off success rate				97.78%	97.84%	100.00%	97.65%	NA	100.00%	100.00%	100.00%

Voice Quality

Vodafone 3G failed to meet the benchmark for Voice quality in indoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

BSNL 3G met the benchmark for call drop rate in indoor locations.

11.1.3.7 Data Drive Test Results - Solapur SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	No Service	100	74	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	70	100	100	100	100	100	100	100
Minimum download speed			98	20	82	85	97	2499	167	110	113
Average throughput for Packet Data			137	24	165	96	113	3557	205	138	145
Latency	<250ms		100	56	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

11.1.3.8 Data Drive Test Results - Solapur SSA-3G

Name of the Parameter	Bench Mark	Aircel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	No Service	100	100	NDR	100
Succesful Data Transmission upload speed attempts	>75%		100	100	NDR	100
Minimum download speed			838	2126	NDR	2386
Average throughput for Packet Data			2310	608	NDR	3205
Latency	<250ms		99	100	NDR	100

Note: TATA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.4 Aurangabad SSA

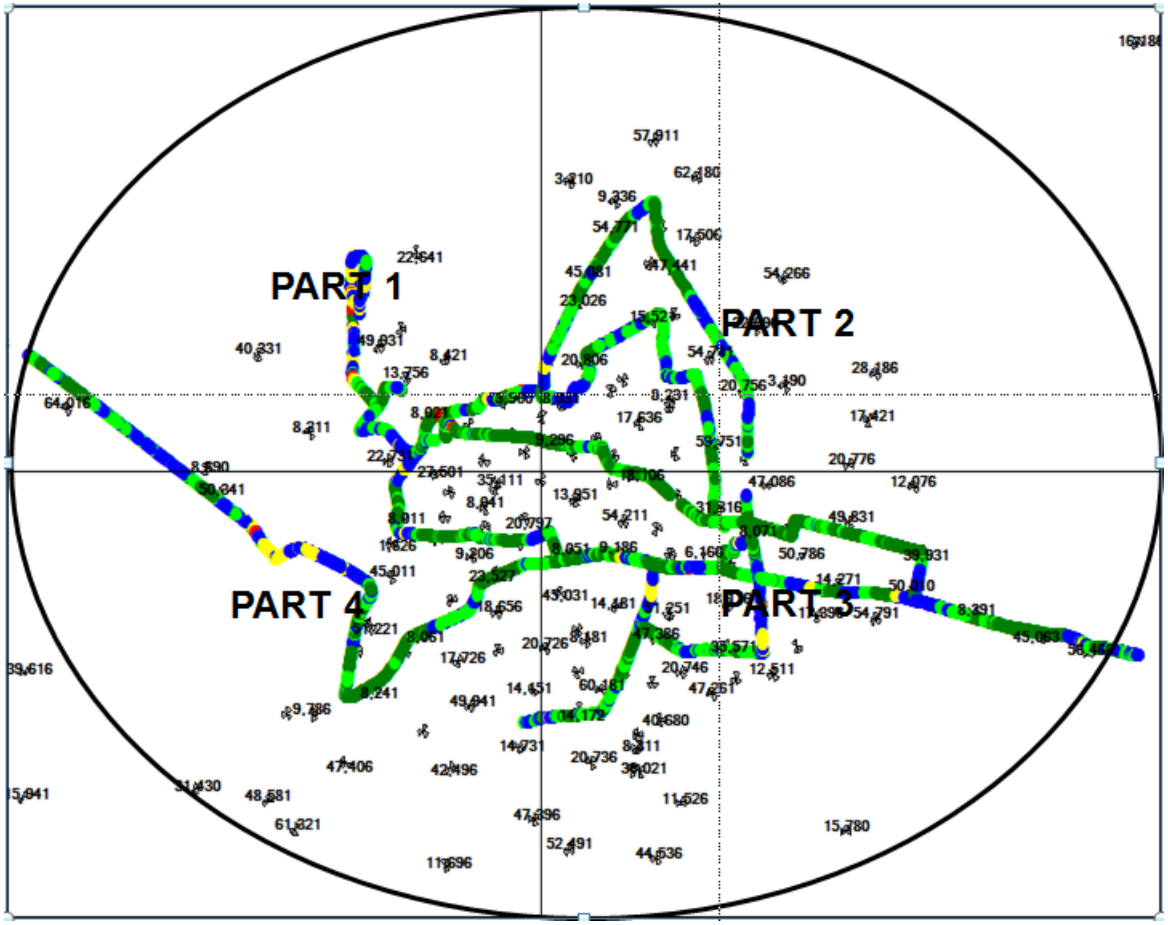
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	AURANGABD	28/03/2016	30/03/2016	251

11.1.4.1 Route Details - Aurangabad SSA

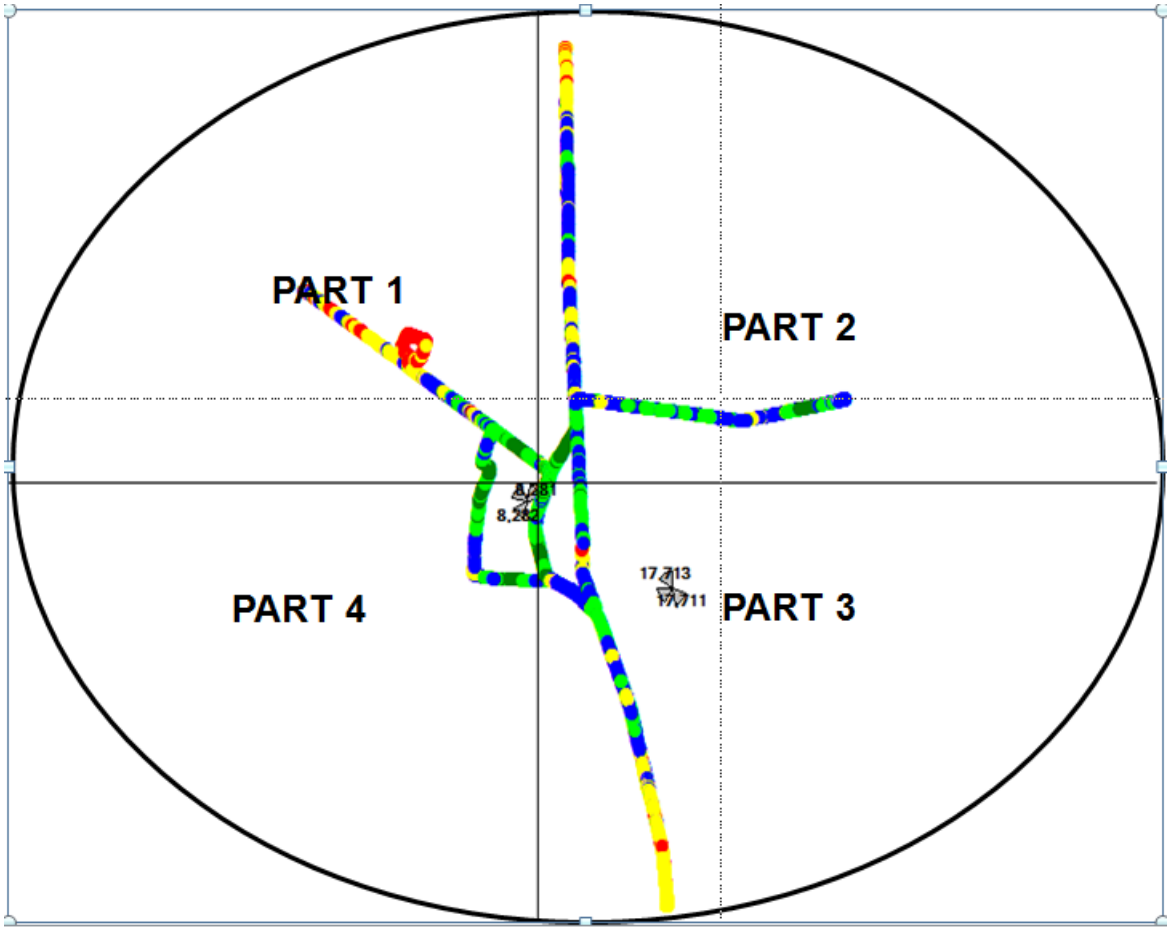
Category	Type of location	March AURANGABD		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Aurangabad within City-, Major roads in Aurangabad City,Highway Aurangabad city, Khultabad within city, Major Roads,Ellora Indoor	Vaijapur within City, Major roads and HW, Gangapur within City, Highway, Waluj MIDC Major Roads, Indoor.	Phulambri Highway, Kannad within city and Major roads, Sillod within city, Major Roads, Highway and Indoor 83 Km
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

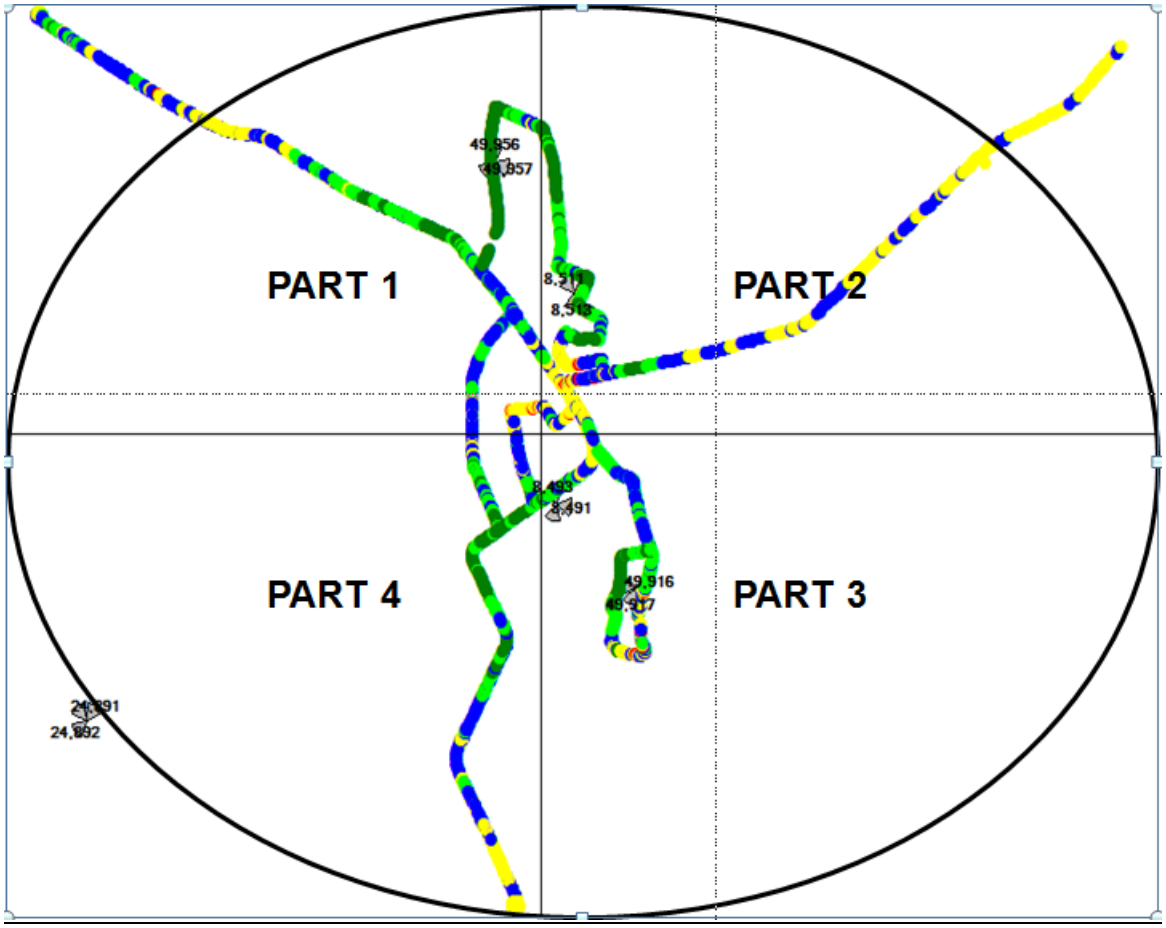
11.1.4.2 Route Map - Aurangabad DAY 1



11.1.4.3 Route Map - Aurangabad DAY 2



11.1.4.4 Route Map - Aurangabad DAY 3



11.1.4.5 Drive Test Results - Aurangabad SSA-2G

AURANAGABADD	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	81.84%	72.53%	54.84%	36.20%	50.35%	98.38%	81.49%	81.79%	66.64%	4.04%	37.08%	99.99%	99.96%	98.86%	92.47%	99.91%	74.15%	100.00%	93.57%
0 to -85 dBm		100.00%	97.57%	96.67%	85.43%	98.16%	94.87%	100.00%	97.62%	99.75%	91.56%	50.47%	72.84%	100.00%	99.99%	99.99%	99.33%	100.00%	93.44%	100.00%	99.29%
0 to -95 dBm		100.00%	99.93%	100.00%	98.31%	100.00%	99.87%	100.00%	99.72%	100.00%	99.69%	99.64%	95.76%	100.00%	100.00%	100.00%	100.00%	100.00%	99.83%	100.00%	99.85%
Voice quality	≥ 95%	97.79%	97.77%	95.74%	96.26%	96.84%	87.81%	98.87%	96.86%	99.92%	98.84%	95.09%	94.80%	99.56%	98.81%	99.75%	97.42%	99.71%	95.64%	99.17%	96.50%
CSSR	≥ 95%	100.00%	96.76%	100.00%	100.00%	100.00%	98.34%	100.00%	99.69%	100.00%	98.55%	100.00%	99.10%	100.00%	100.00%	100.00%	99.67%	100.00%	100.00%	100.00%	99.43%
%age Blocked calls		0.00%	0.93%	0.00%	0.00%	0.00%	1.66%	0.00%	0.00%	0.00%	1.45%	0.00%	0.90%	0.00%	0.00%	0.00%	0.33%	0.00%	0.00%	0.00%	0.57%
Call drop rate	≤ 2%	0.00%	0.96%	0.00%	0.00%	0.00%	1.66%	0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%	0.00%	0.66%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	97.53%	100.00%	100.00%	100.00%	99.60%	100.00%	99.79%	100.00%	100.00%	100.00%	99.03%	100.00%	100.00%	100.00%	99.78%	100.00%	99.67%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

All operators met the benchmark of call drop rate.

11.1.4.6 Drive Test Results - Aurangabad SSA-3G

AURANAGABADD	B'mark	Airtel		BSNL		Idea		TATA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		62.20%	39.27%	68.55%	40.04%	99.96%	90.72%	77.23%	49.05%
0 to -85 dBm				99.04%	71.25%	98.22%	75.40%	100.00%	98.67%	82.34%	72.05%
0 to -95 dBm				100.00%	93.55%	100.00%	94.57%	100.00%	100.00%	97.99%	92.24%
Voice quality	≥ 95%			100.00%	98.37%	NDR	NDR	99.96%	98.43%	95.94%	95.45%
CSSR	≥ 95%			100.00%	98.73%	100.00%	100.00%	100.00%	100.00%	100.00%	99.69%
%age Blocked calls				0.00%	1.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%
Call drop rate	≤ 2%			0.00%	0.64%	0.00%	0.00%	0.00%	0.00%	0.00%	0.31%
Hands off success rate				100.00%	99.22%	100.00%	100.00%	100.00%	99.56%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR.

Call Drop Rate

All operators met the benchmark for call drop rate.

11.1.4.7 Data Drive Test Results - Aurangabad SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	99	100	100	100	NDR	100	100	100
Minimum download speed		96	113	12	112	55	60	NDR	111	149	138
Average throughput for Packet Data		105	132	39	145	78	86	NDR	136	175	159
Latency	<250ms	100	100	100	100	100	100	NDR	100	100	100

Note: TATA CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.4.8 Data Drive Test Results - Aurangabad SSA-3G

Name of the Parameter	Bench Mark	Aircel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	No Service	99.44028	100	100	100
Succesful Data Transmission upload speed attempts	>75%		99.25287	100	100	100
Minimum download speed			723	1214	2356	2814
Average throughput for Packet Data			2497	2234	3561	3316
Latency	<250ms		100	100	100	100

All operators met the TRAI benchmark for data drive test.

11.1.5 Jalna SSA

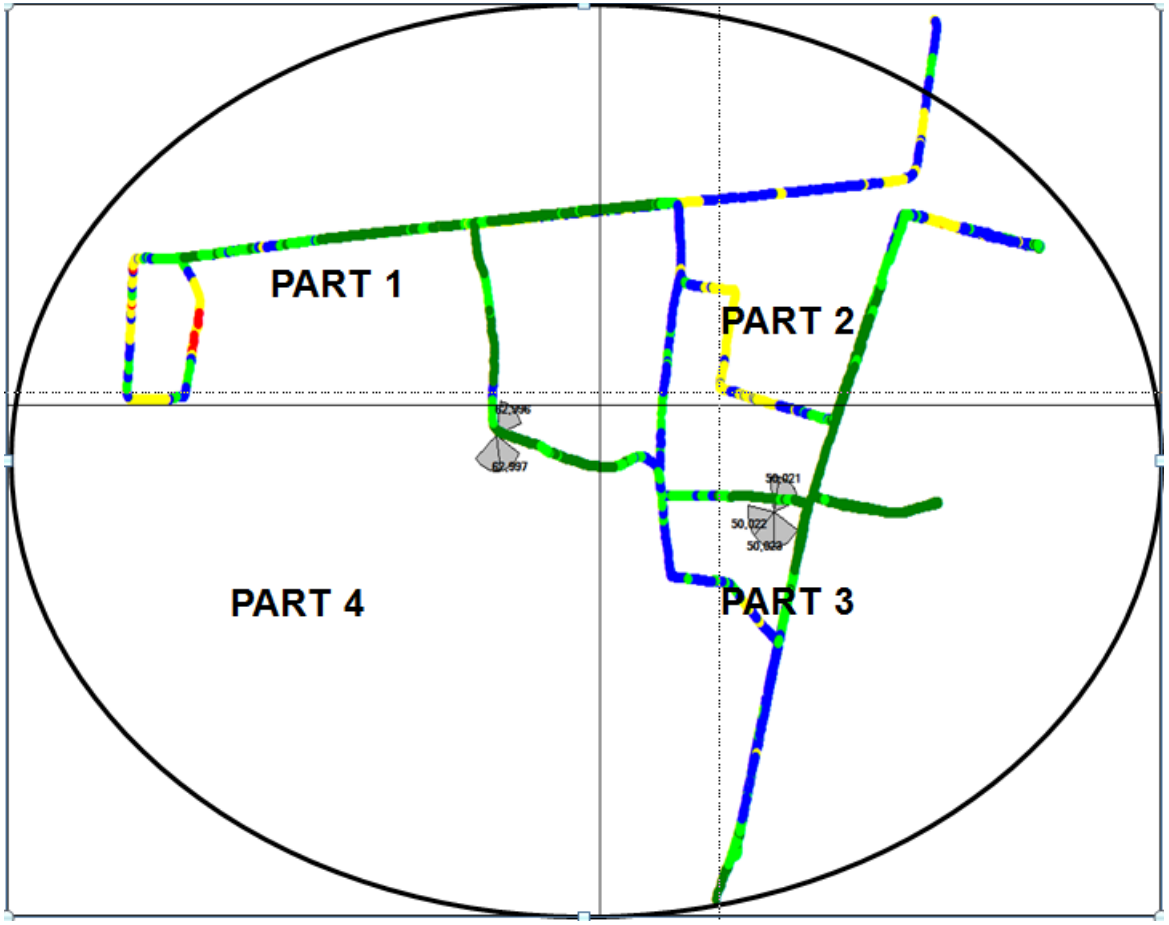
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Jalna	31/03/2016	04-02-2016	300

11.1.5.1 Route Details - Jalna SSA

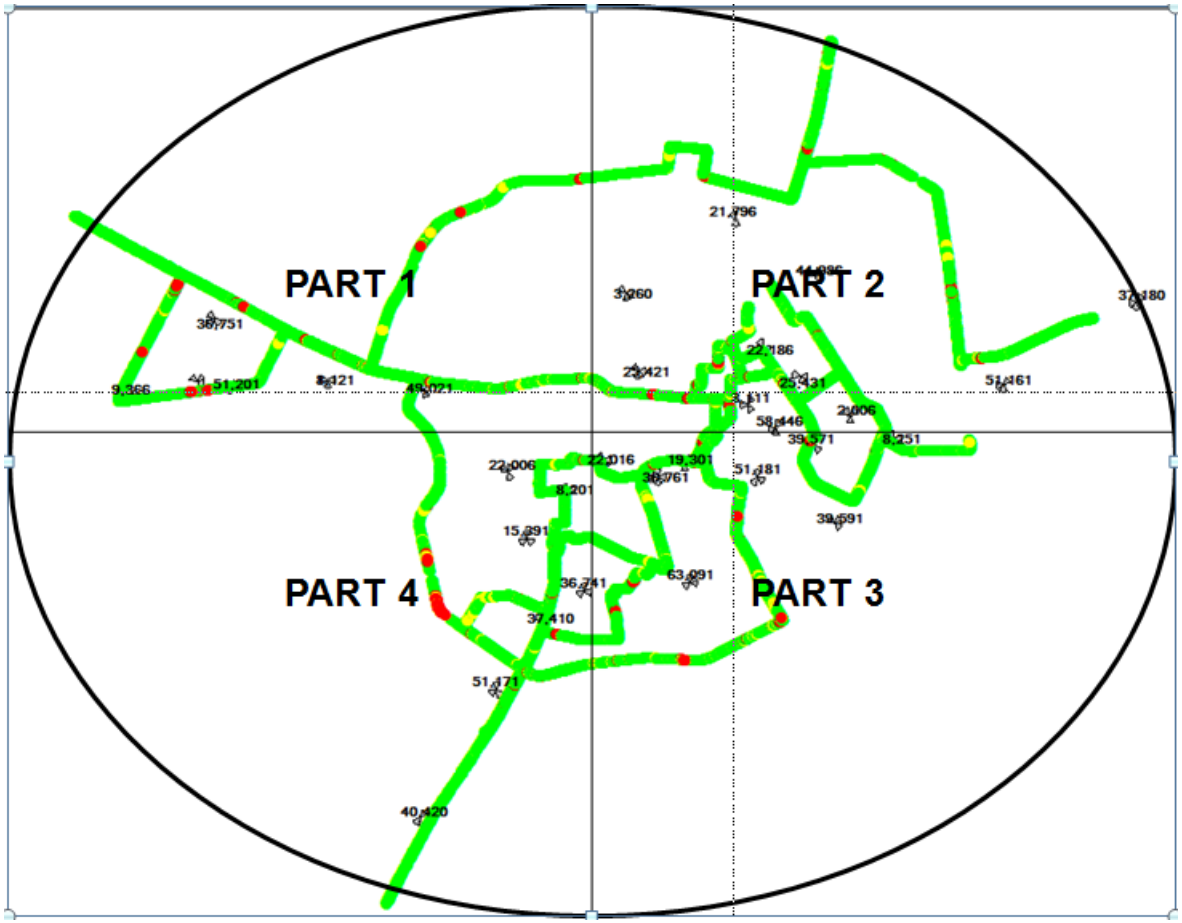
Category	Type of location	March		
		Jalna		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Jalna City, Major Roads, Highways; Ambad City and Major Roads; Ghansawangi City.	Partur City and Major Roads; Badnapur City and Highway; Mantha Major Roads and Highway	Tembhurni City; Jafrabad City and Highway; Bhokardan City and Highway.; Rajur City and Highway
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

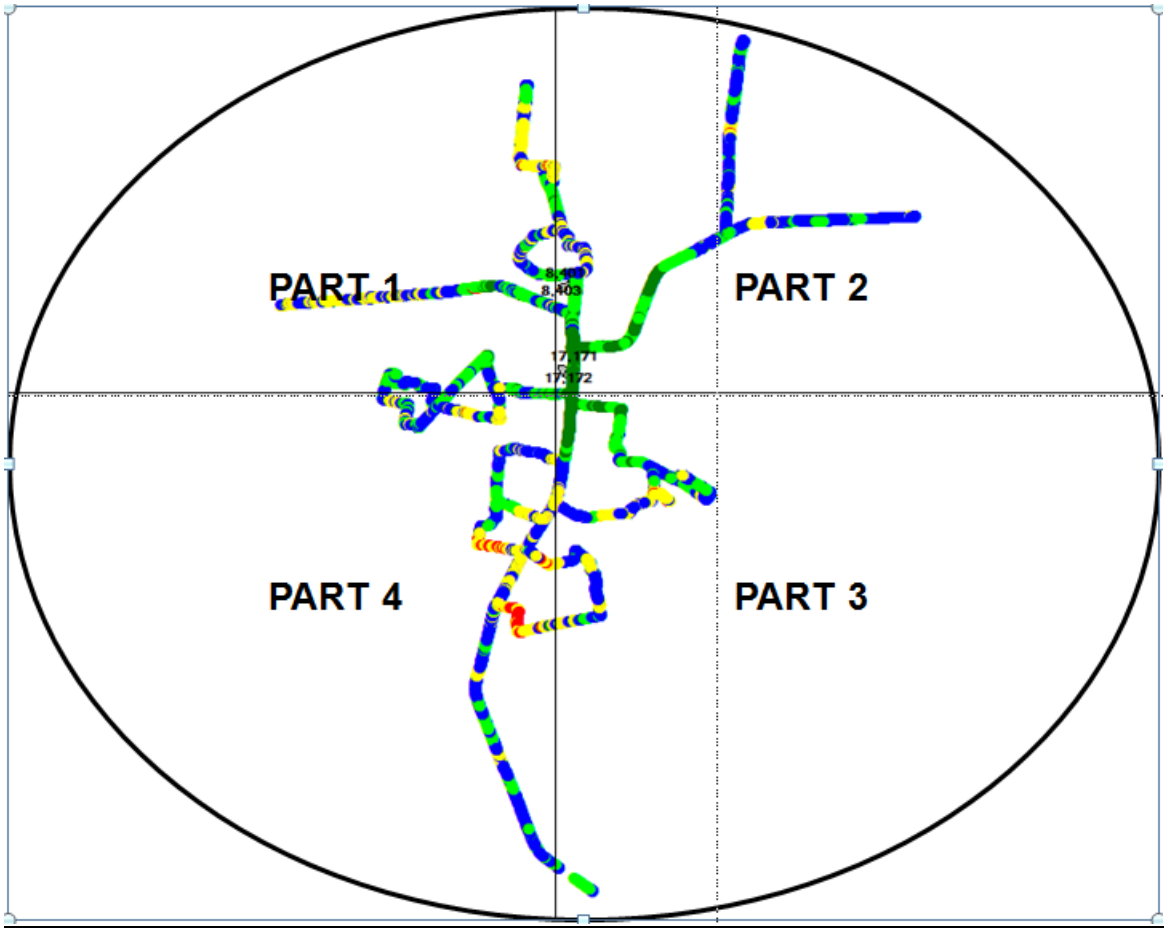
11.1.5.2 Route Map - Jalna DAY 1



11.1.5.3 Route Map - Jalna DAY 2



11.1.5.4 Route Map - Jalna DAY 3



11.1.5.5 Drive Test Results - Jalna SSA-2G

Janla	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Telenor		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		89.07%	49.23%	59.66%	42.37%	99.51%	81.24%	92.83%	57.87%	95.02%	38.67%	100.00%	99.97%	97.21%	91.05%	98.18%	72.27%	100.00%	89.72%
0 to -85 dBm				99.83%	79.04%	98.30%	92.23%	99.97%	96.89%	99.70%	86.13%	99.92%	75.34%	100.00%	99.99%	99.98%	99.25%	100.00%	93.81%	100.00%	98.64%
0 to -95 dBm				100.00%	95.48%	100.00%	99.34%	100.00%	99.55%	100.00%	98.77%	100.00%	95.01%	100.00%	100.00%	100.00%	100.00%	100.00%	99.57%	100.00%	99.78%
Voice quality	≥ 95%			99.55%	96.43%	88.02%	89.21%	98.62%	97.04%	100.00%	98.85%	99.84%	95.79%	99.54%	98.60%	99.34%	98.25%	99.38%	98.04%	98.85%	96.12%
CSSR	≥ 95%			100.00%	99.46%	100.00%	99.23%	100.00%	100.00%	100.00%	99.67%	100.00%	98.37%	100.00%	100.00%	100.00%	99.43%	100.00%	99.74%	100.00%	99.75%
%age Blocked calls				0.00%	0.54%	0.00%	0.77%	0.00%	0.00%	0.00%	0.33%	0.00%	1.63%	0.00%	0.00%	0.00%	0.57%	0.00%	0.26%	0.00%	0.25%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	2.06%	0.00%	0.00%	0.00%	0.00%	0.00%	2.98%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	98.82%	100.00%	98.77%	100.00%	100.00%	100.00%	97.41%	100.00%	100.00%	100.00%	99.79%	100.00%	99.31%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark for voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmarks of CSSR.

Call Drop Rate

BSNL and Reliance GSM failed to meet the benchmark of call drop rate in outdoor locations.

11.1.5.6 Drive Test Results - Jalna SSA-3G

Jalna	B'mark	Airtel		BSNL		Idea		TATA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		100.00%	28.68%	99.93%	35.04%	94.14%	91.02%	100.00%	50.35%
0 to -85 dBm				100.00%	61.12%	100.00%	71.42%	100.00%	97.19%	100.00%	82.87%
0 to -95 dBm				100.00%	87.90%	100.00%	98.48%	100.00%	100.00%	100.00%	96.77%
Voice quality	≥ 95%			100.00%	95.95%	NDR	NDR	99.43%	99.70%	99.93%	98.78%
CSSR	≥ 95%			86.96%	94.89%	100.00%	100.00%	100.00%	100.00%	100.00%	99.70%
%age Blocked calls				13.04%	5.11%	0.00%	0.00%	0.00%	0.00%	0.00%	0.30%
Call drop rate	≤ 2%			0.00%	0.95%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	99.40%	100.00%	100.00%

Voice Quality

All operators met the benchmark for Voice quality in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

All operators met the benchmark for call drop rate in outdoor locations.

11.1.5.7 Data Drive Test Results - Jalna SSA-2G

Name of the Parameter	Bench Mark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Succesful Data Transmission download speed attempts	>80%	No Service	100	100	100	100	100	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	NDR	100	100	100
Minimum download speed			100	66	115	65	46	NDR	105	157	140
Average throughput for Packet Data			125	120	155	98	94	NDR	132	176	159
Latency	<250ms		100	100	100	100	100	NDR	100	100	100

Note: TATA CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.5.8 Data Drive Test Results - Jalna SSA-3G

Name of the Parameter	Bench Mark	Aircel 3G	BSNL 3G	Idea 3G	Tata 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	No Service	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100
Minimum download speed			566	1232	2294	2660
Average throughput for Packet Data			1396	2206	3211	3315
Latency	<250ms		100	100	100	100

All operators met the TRAI benchmark for data drive test.

12 ANNEXURE– CONSOLIDATED-2G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		5921	32217	20700	25909	5226	8202	6164	13961	13611	26947
Sum of downtime of BTSs in a month (in hours)		2123	4925	286657	14796	4059	8748	1688	47631	17241	24956
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	0.02%	1.86%	0.08%	0.10%	0.14%	0.04%	0.46%	0.17%	0.12%
Number of BTSs having accumulated downtime >24 hours		1	0	274	20	31	108	0	0	59	46
Worst affected BTSs due to downtime	≤ 2%	0.02%	0.00%	1.32%	0.08%	0.59%	1.32%	0.00%	0.00%	0.43%	0.17%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		5910	32254	20700	25909	5222	8197	6164	13961	13587	27147
Sum of downtime of BTSs in a month (in hours)		320	580	27296	1736	370	1092	101	3993	1781	2356
BTSs accumulated downtime (not available for service)	≤ 2%	0.08%	0.02%	1.83%	0.09%	0.10%	0.19%	0.02%	0.40%	0.18%	0.12%
Number of BTSs having accumulated downtime >24 hours		0	0	23	0	1	0	0	0	0	1
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.11%	0.00%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.27%	97.91%	97.75%	97.83%	98.17%	96.79%	98.50%	98.70%	98.12%	99.23%
SDCCH/Paging channel congestion	≤ 1%	0.13%	0.11%	0.54%	0.58%	#DIV/0!	0.19%	#DIV/0!	0.12%	0.33%	0.39%
TCH congestion	≤ 2%	0.16%	0.55%	1.15%	1.46%	0.83%	0.57%	0.26%	0.18%	0.69%	0.45%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.59%	97.85%	96.59%	97.70%	98.72%	97.04%	98.59%	98.40%	98.13%	99.32%
SDCCH/Paging channel congestion	≤ 1%	0.12%	0.11%	0.46%	0.67%	#DIV/0!	0.20%	#DIV/0!	0.15%	0.55%	0.42%
TCH congestion	≤ 2%	0.04%	0.71%	1.19%	1.58%	0.69%	0.54%	0.21%	0.16%	0.77%	0.55%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		1293	2080	2223	2270	2248	2115	1986	2239	2265	2317
Total number of successful calls established		1270	2077	2146	2265	2193	2081	1985	2231	2261	2308
CSSR	≥ 95%	98.22%	99.86%	96.54%	99.78%	97.55%	98.39%	99.95%	99.64%	99.82%	99.61%
%age blocked calls		1.78%	0.14%	3.46%	0.22%	2.45%	1.61%	0.05%	0.36%	0.18%	0.39%

Data Source: Network Operations Center(NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

12.3 Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		149404614	439190430	332938254	2050003496	376693314	134874896	99471044	175984705	677460034	5329874014
Total number of calls dropped		1033263	2759395	3859149	12598799	395209	147575	762843	630504	5662625	38485851
Call drop rate	≤ 2%	0.69%	0.63%	1.16%	0.61%	0.10%	0.11%	0.77%	0.36%	0.84%	0.72%
Total number of cells in the network		17875	98522	60831	104652	15660	24462	191446	27828	41198	1039875
Total number of cells having more than 3% TCH		543	1663	1721	2264	220	115	4249	528	1616	28367
Worst affected cells having more than 3% TCH	≤ 3%	3.04%	1.69%	2.83%	2.16%	1.41%	0.47%	2.22%	1.90%	3.92%	2.73%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		181451734	38269953	33911368	825758035	38512642	14449643	13267581	17806433	65666116	73323053
Total number of calls dropped		988228	247997	381391	5165030	47920	11925	141844	77325	579499	525174
Call drop rate	≤ 2%	0.54%	0.65%	1.12%	0.63%	0.12%	0.08%	1.07%	0.43%	0.88%	0.72%
Total number of cells in the network		17864	98518	60831	104329	15548	24447	91674	27767	41148	70224
Total number of cells having more than 3% TCH		489	1674	1734	2328	204	91	1221	524	1726	1923
Worst affected cells having more than 3% TCH	≤ 3%	2.74%	1.70%	2.85%	2.23%	1.31%	0.37%	1.33%	1.89%	4.19%	2.74%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		1275	2077	2152	2266	2194	2105	1985	2232	2263	2309
Total number of calls dropped		7	0	46	0	6	14	3	11	1	1
Call drop rate	≤ 2%	0.55%	0.00%	2.14%	0.00%	0.27%	0.67%	0.15%	0.49%	0.04%	0.04%

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

12.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		23770366509	8202934474	329204200	228455803712	0	18910733784	10799376623	35213465499	123112476115	144887091266
Total number of calls with good voice quality		22653844531	7957855904	317928562	223238473923	0	18718234183	2195751016	34304721960	119849387048	140554430650
%age calls with good voice quality	≥ 95%	95.30%	97.01%	96.57%	97.72%	NA	98.98%	99.09%	97.42%	97.35%	97.01%
Live measurement results for Voice quality-3 Day data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		26903454521	30609711842	33911368	92461999496	0	2037414724	858235488	14797677863	12130183552	11857535198
Total number of calls with good voice quality		25793476822	29732380907	32866441	90256254133	0	2016667767	241305481	14415697091	11798018110	11510494349
%age calls with good voice quality	≥ 95%	95.87%	97.13%	96.92%	97.61%	NA	98.98%	98.69%	97.42%	97.26%	97.07%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		183361	1260379	291671	602265	0	0	0	4481138	276672	881677
Total number of calls with good voice quality		176764	1227071	258720	582368	0	0	0	4377313	266268	851935
%age calls with good voice quality	≥ 95%	96.40%	97.36%	88.70%	96.70%	NA	NA	NA	97.68%	96.24%	96.63%

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		232	1483	189	2879	354	140	1189	582	79	485
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		56443	905676	312817	3466461	76730	78299	232241	202992	441808	6398044
Traffic served for all POIs (B)- in erlangs		37392	525806	173379	948536	19119	40570	92146	101835	247284	6160110
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		234	1516	189	2882	355	143	1189	582	77	485
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		56131	875685	310307	3469608	72855	77059	225972	201493	498123	6398044
Traffic served for all POIs (B)- in erlangs		17793	512214	176798	944379	17252	34732	92486	102755	255136	6160110
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

13 ANNEXURE – CONSOLIDATED-3G

13.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		0	8092	18268	9126	18068
Sum of downtime (i.e. total outage time) of Node Bs		0	110890	10517	153	22180
Node Bs downtime (not available for service)	≤ 2%	NDR	1.84%	0.08%	0.00%	0.16%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	128	5	0	67
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.58%	0.03%	0.00%	0.37%
Live Measurement Results for Network Availability- 3 Day live data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		0	8092	18268	6828	18068
Sum of downtime (i.e. total outage time) of Node Bs		0	44710	1441	20	20899
Node Bs downtime (not available for service)	≤ 2%	NDR	7.67%	0.11%	0.00%	1.61%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	50	0	0	37
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.62%	0.00%	0.00%	0.20%

Data Source: Operations and Maintenance Center (OMC) of the operators

13.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.67%	99.64%	98.76%	99.74%
RRC Congestion	≤ 1%	NDR	0.85%	0.31%	0.78%	0.23%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.36%	0.09%	2.71%	0.08%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.58%	99.64%	95.10%	98.57%
RRC Congestion	≤ 1%	NDR	0.88%	0.29%	0.46%	0.33%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.51%	0.10%	0.59%	0.19%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		1164	2013	1678	981	2021
Total number of RRC established (B)		1164	1968	1674	981	2015
Call setup success rate (B/A*100)	≥ 95%	100.00%	97.76%	99.76%	100.00%	99.70%
%age blocked calls		0.00%	2.24%	0.24%	0.00%	0.30%

Data Source: Network Operations Center(NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

13.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		0	76541083	1575850140	89339825	176406932
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	1083800	19240531	318278	386954
Call drop rate (B/A*100)	≤ 2%	NDR	1.42%	1.22%	0.36%	0.22%
Total no. of cells in the licensed service area (B)		0	24390	81946	27108	56152
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		0	615	1492	759	910
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.52%	1.82%	2.80%	1.62%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		0	29635044	1297225862	34973077	103263345
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	435488	18433210	160268	122444
Call drop rate (B/A*100)	≤ 2%	NDR	1.47%	1.42%	0.46%	0.12%
Total no. of cells in the licensed service area (B)		0	24297	83292	27104	56193
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		0	697	1342	728	788
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.87%	1.61%	2.69%	1.40%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		1164	2371	1961	980	2015
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	44	1	2	1
Call drop rate (B/A*100)	≤ 2%	0.00%	1.86%	0.05%	0.20%	0.05%

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

13.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	707356623902	899999068884	417877157266
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	697583548031	804524182795	413328886420
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NA	98.62%	89.39%	98.91%
Live measurement results for Voice quality-3 Day data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	284258394235	752918344384	119478843792
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	256978917032	649824175802	116976208584
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NA	90.40%	86.31%	97.91%
Drive test results for Voice quality (Average of three drive tests) - DT data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1164	643554	0	2443183	4215241
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1164	622302	0	2427793	4057784
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	100.00%	96.70%	NA	99.37%	96.26%

Data Source: Network Operations Center(NOC) of the operators and Drive test reports submitted by operators to auditors

13.5 POI CONGESTION

Audit Results for POI Congestion- PMR data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		0	189	2879	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	313135	3467399	201423	0
Traffic served for all POIs (B)- in erlangs		0	172373	942380	102416	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		0	189	2882	576	0
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	310518	3470545	199924	0
Traffic served for all POIs (B)- in erlangs		0	173128	938223	103336	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center(NOC) of the operators

14 ANNEXURE –CUSTOMER SERVICES

14.1 METERING AND BILLING CREDIBILITY

Billing performance											
Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		4347	1870396	966267	32554	500711	158669	7450	6581	NA	0
Total number of bills disputed		0	2346	14	10	396	140	0	0	NA	0
Total number of valid billing complaints		0	446	0	7	375	140	0	0	NA	0
Total complaints considered invalid		0	1900	14	3	21	0	0	0	NA	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.13%	0.00%	0.06%	0.08%	0.09%	0.00%	0.00%	NA	NA
January											
Total bills generated during the first billing cycle		1492	610391	333230	5699	170620	47719	564	5801	NA	0
Total number of bills disputed in first billing cycle		0	787	3	3	153	44	0	0	NA	0
Total number of valid billing complaints (billing cycle 1)		0	135	0	1	153	44	0	0	NA	0
Total complaints considered invalid (billing cycle 1)		0	652	3	2	0	0	0	0	NA	0
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.13%	0.00%	0.05%	0.09%	0.09%	0.00%	0.00%	NA	NA
February											
Total bills generated during the second billing cycle		1453	616694	325533	23654	166975	54990	2365	325	NA	0
Total number of bills disputed in second billing cycle		0	806	4	3	148	47	0	0	NA	0
Total number of valid billing complaints (billing cycle 2)		0	171	0	3	148	47	0	0	NA	0
Total complaints considered invalid (billing cycle 2)		0	635	4	0	0	0	0	0	NA	0
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.13%	0.00%	0.01%	0.09%	0.09%	0.00%	0.00%	NA	NA
March											
Total bills generated during the third billing cycle		1402	643311	307504	3201	163116	55960	4521	455	NA	0
Total number of bills disputed in third billing cycle		0	753	7	4	95	49	0	0	NA	0
Total number of valid billing complaints (billing cycle 3)		0	140	0	3	74	49	0	0	NA	0
Total complaints considered invalid (billing cycle 3)		0	613	7	1	21	0	0	0	NA	0
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.12%	0.00%	0.12%	0.06%	0.09%	0.00%	0.00%	NA	NA

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of charging complaints (valid) - sum of 3 months		47	361	610	3650	222	3381	0	0	140	0
Total complaints considered invalid (sum of 3 months)		0	7780	1691	6550	311	0	0	0	0	0
Total number of charging complaints (sum of 3 months)		47	8141	2301	10200	533	3381	0	0	140	0
Total no of customers served (Sum of 3 months)		7764158	45283121	15820227	15364209	4670479	11287678	6598364	9851006	0	0
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.02%	0.01%	0.07%	0.01%	0.03%	0.00%	0.00%	NA	NA

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of billing/charging complaints		47	10487	2315	3026	929	3521	2284	8773	140	140
Total number of complaints resolved in favour of customer		47	807	610	3026	597	3521	2019	8751	140	140
Total complaints considered invalid		0	9680	1705	0	332	0	265	22	0	0
Number of complaints resolved in 4 weeks		47	807	610	3026	597	3521	2019	8751	140	140
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		47	807	610	3026	597	3521	2019	8751	140	140
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		47	807	610	3026	597	3521	2019	8751	0	0
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	100	100	45	75	77	100	100	NA	59
Number of cases resolved in 4 weeks		91	80	92	41	74	74	90	95	NA	55
Percentage cases resolved in 4 weeks	≥ 98%	91.00%	80.00%	92.00%	91.11%	98.67%	96.10%	90.00%	95.00%	NA	93.22%
Number of cases resolved in 6 weeks		100	100	100	45	75	77	100	100	NA	59
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Billing Center of the operators

14.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		6995970	3948121	6552684	6592310	1280534	4873366	78954011	68957420	16247097	16247097
Number of calls getting connected and answered (electronically)		6868034	3947942	6552684	6492310	1273108	4857320	78954011	65695641	16181080	16181080
Percentage calls getting connected and answered	≥ 95%	98.17%	100.00%	100.00%	98.48%	99.42%	99.67%	100.00%	95.27%	99.59%	99.59%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received (3 months)		1273228	6283164	2178316	3501930	241539	910754	1608424	1718424	3814279	3814279
Total Number of calls answered within 90 seconds (3 months)		1229269	5669175	2141991	3490254	230933	878459	1594777	1635777	3794936	3794936
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	96.55%	90.23%	98.33%	99.67%	95.61%	96.45%	99.15%	95.19%	99.49%	99.49%
January											
Total calls received (Month 1)		453101	2094190	763105	265401	87135	346591	224230	254230	1500377	1500377
Total calls answered within 90 seconds (Month 1)		435418	1891630	738954	262411	81147	333490	221254	241254	1496429	1496429
% calls answered within 90 seconds (Month 1)	≥ 95%	96.10%	90.33%	96.84%	98.87%	93.13%	96.22%	98.67%	94.90%	99.74%	99.74%
February											
Total calls received (Month 2)		403722	1988739	696788	2546987	80943	301509	869542	879542	1169053	1169053
Total calls answered within 90 seconds (Month 2)		392447	1878529	686364	2538411	78990	289899	868942	818942	1162479	1162479
% calls answered within 90 seconds (Month 2)	≥ 95%	97.21%	94.46%	98.50%	99.66%	97.59%	96.15%	99.93%	93.11%	99.44%	99.44%
March											
Total calls received (Month 3)		416405	2200235	718423	689542	73461	262654	514652	584652	1144849	1144849
Total calls answered within 90 seconds (Month 3)		401404	1899016	716673	689432	70796	255070	504581	575581	1136028	1136028
% calls answered within 90 seconds (Month 3)	≥ 95%	96.40%	86.31%	99.76%	99.98%	96.37%	97.11%	98.04%	98.45%	99.23%	99.23%

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	100	100	100	100	100	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

14.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of closure request		3	8741	38221	20658	4081	429	2045	186	0	0
Number of requests attended within 7 days		3	8741	38221	20658	4081	429	2045	186	0	0
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA

Data Source: Customer Service Center of the operators

14.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of cases requiring refund of deposits		25	1332	1238	6530	1954	809	69	45	0	0
Total number of cases where refund was made within 60 days		21	1332	1238	6511	1954	809	69	45	0	0
Percentage cases in which refund was receive within 60 days	100.00%	84.00%	100.00%	100.00%	99.71%	100.00%	100.00%	100.00%	100.00%	NA	NA

Data Source: Billing Center of the operators

14.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling for level 1 services											
Level 1 services		Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300
Calls answered		131	189	189	189	300	275	240	217	253	251
% of calls connected	≥ 95%	43.67%	63.00%	63.00%	63.00%	100.00%	91.67%	80.00%	72.33%	84.33%	83.67%

Data Source: Live calls made by auditors from operator's network

14.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling results for resolution of service requests										
Resolution of service requests	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls made		100	85	64	95	86	81	77	41	45
Number of cases resolved to satisfaction		92	80	60	89	76	81	70	40	45
Percentage cases resolved in four weeks	≥ 95%	92.00%	94.12%	93.75%	93.68%	88.37%	100.00%	90.91%	97.56%	100.00%

Data Source: Live calls made by auditors from operator's network

14.7 LEVEL 1 SERVICE CALLS MADE

All the numbers given in mandatory list in Section 2.4.2.4.1 were tested. The following table provides the numbers that are activated for each operator. A tick (✔) for an operator signifies that the number was active for the operator.

Live calls were made to the active numbers to test the calls answered. The details of the same have been given below for each operator.

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	8
101	Fire		N		
102	Ambulance	Y		18	8
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	8
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		18	8
182	Indian Railway Security Helpline	Y		18	7
1033	Road Accident Management Service	Y		17	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		18	8
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	7
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		18	8

1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		18	8
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	7
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		17	8
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		18	7
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		17	8
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		17	8
11212	Complaint of Electricity	Y		17	8
11216	Drinking Water Supply	Y		17	8
11250	Election Commission of India		N		
	Total			300	131

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	11
101	Fire	Y		18	11
102	Ambulance	Y		17	11
104	Health Information Helpline		N		

108	Emergency and Disaster Management Helpline	Y		18	11
138	All India Helpine for Passangers	Y		18	12
1412	Public Road Transport Utility Service	Y		18	11
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		17	11
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	12
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	11
1071	Air Accident Helpline	Y		17	11
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	11
101212	Central Accident and Trauma Services (CATS)	Y		17	11
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board	Y		18	11
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		18	11
1514	National Career Service(NCS)	Y		18	11
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		18	11
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	11
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total			300	189

BSNL

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	13
101	Fire	Y		20	12
102	Ambulance	Y		20	13
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		20	13
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	13
182	Indian Railway Security Helpline	Y		20	12
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		20	13
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		20	12

1070	Relief Commission for Natural Calamities	Y		20	13
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		20	13
10127	National AIDS Helpline to NACO	Y		20	13
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		20	12
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		20	13
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		20	12
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		20	12
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total			300	189

Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected

100	Police		N		
101	Fire	Y		19	12
102	Ambulance	Y		19	12
104	Health Information Helpline	Y		18	11
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		19	11
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		19	11
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		19	12
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		19	12
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		19	12
1072	Rail Accident Helpline	Y		19	12
1073	Road Accident Helpline	Y		19	12
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		19	12
10127	National AIDS Helpline to NACO	Y		18	12
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)	Y		19	12

10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	12
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		18	12
11216	Drinking Water Supply	Y		18	12
11250	Election Commission of India		N		
	Total			300	189

Reliance CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire	Y		18	18
102	Ambulance		N		
104	Health Information Helpline	Y		17	17
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	17
181	Chief Minister Helpline	Y		18	18
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	17
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		

1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	17
1064	Anti Corruption Helpline	Y		18	18
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		18	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		18	18
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	17
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	18
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		18	18
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)	Y		17	17
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		18	18
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		18	18
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		18	18
11250	Election Commission of India		N		

	Total			300	300
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire		N		
102	Ambulance	Y		17	16
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	16
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	16
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		18	16
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		17	17
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		17	16
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16

101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		18	17
105812	Mother and Child Tracking (MCTH)	Y		18	16
10740	Central Pollution Control Board	Y		18	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	16
1514	National Career Service(NCS)				
15100	Free Legal Service Helpline	Y		18	16
155304	Municipal Corporations	Y		18	16
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	16
11212	Complaint of Electricity	Y		18	16
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total			300	275

TATA CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	14
101	Fire	Y		17	13
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		16	14
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	13
181	Chief Minister Helpline		N		

182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		16	13
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	13
1064	Anti Corruption Helpline	Y		17	14
1070	Relief Commission for Natural Calamities	Y		17	13
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		17	13
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		16	13
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	14
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		17	13
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	14
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		16	13

11203	Sashastra Seema Bal (SSB)	Y		17	13
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		16	13
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		16	13
	Total			300	240

TATA GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		23	17
101	Fire	Y		23	17
102	Ambulance		N		
104	Health Information Helpline	Y		23	17
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		24	17
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		23	16
1033	Road Accident Management Service	Y		23	17
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		23	17
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		23	16
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		

1077	Control Room for District Collector	Y		23	17
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		23	16
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		23	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		23	17
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		23	17
11250	Election Commission of India		N		
	Total			300	217

Telenor

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	23
101	Fire	Y		28	23
102	Ambulance		N		
104	Health Information Helpline		N		

108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		27	23
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		27	23
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		28	23
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		27	23
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		27	23
10120	Call Alart (Crime Branch)				
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		28	23
10741	Pollution Control Board				
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)	Y		27	23
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		27	23
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		27	23
11250	Election Commission of India		N		
	Total			300	253

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	15
101	Fire	Y		18	15
102	Ambulance	Y		17	14
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	15
181	Chief Minister Helpline	Y		17	14
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	15
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		18	14
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		18	15
1064	Anti Corruption Helpline	Y		18	15

1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		18	15
1072	Rail Accident Helpline	Y		17	15
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		18	15
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		18	15
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	15
1514	National Career Service(NCS)	Y		17	15
15100	Free Legal Service Helpline	Y		18	14
155304	Municipal Corporations	Y		18	15
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total			300	251

Data Source: Live calls made by auditors from operator's network

15 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***No of established Calls =*** ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)]))/***No of Attempted Calls =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	***SDCCH Failure=*** ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/***SDCCH attempts =*** ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	***TCH Failures=*** ((Failed TCH Seizures due to Busy TCH (Signaling Channel)+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/***TCH Attempts =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type

4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	***The total no of dropped calls=*** **([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/*Total no of calls successfully established (where traffic channel is allotted) =* ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])**
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	**Above formula with counters being used in CBBH.**
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	***Connection with good quality voice =*** **((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5))/*Total voice samples=*((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+:Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))**

15.1.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.

Sl No.	KPI	Ericsson
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	**SDCCH congestion= (SDCCH Failure/SDCCH attempts)%**	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	**TCH congestion= (TCH Failures /TCH Attempts)%**	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100
4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	Above formula with counters being used in CBBH.
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.

TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

15.1.2 NSN (NOKIA SIEMENS NETWORKS)

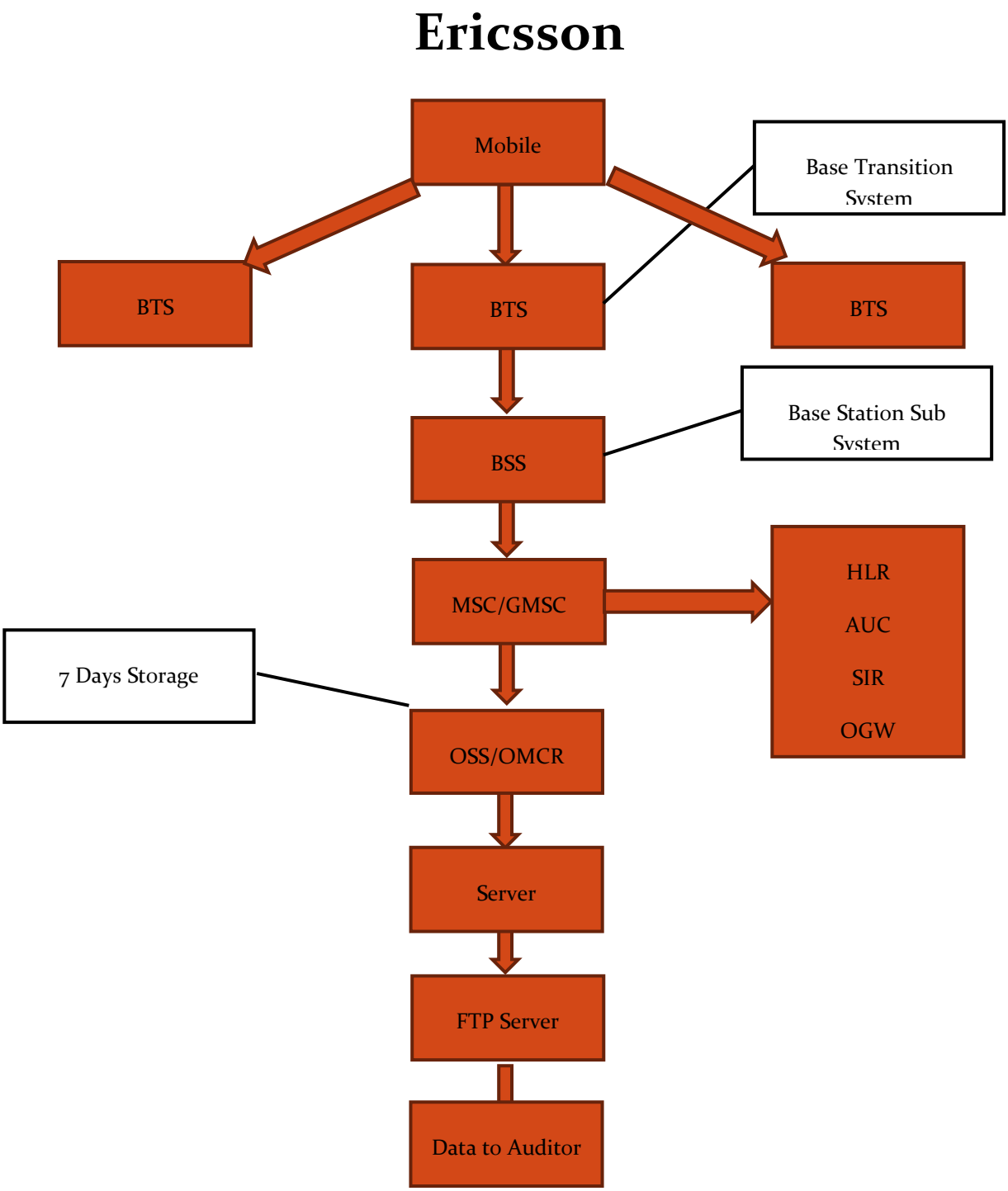
NSN provides network support to Vodafone in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

15.2 BLOCK SCHEMATIC DIAGRAMS

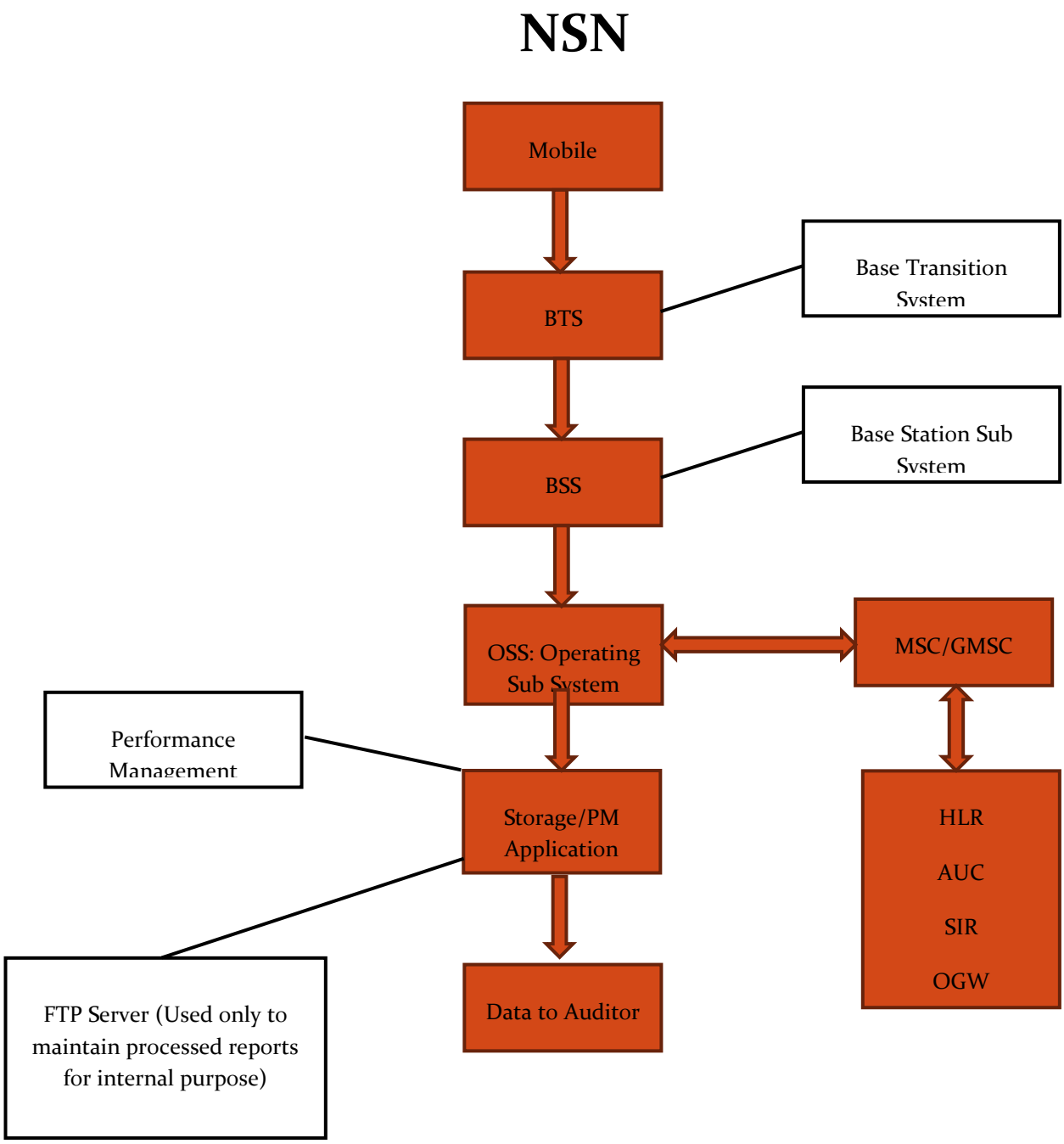
15.2.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.



15.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



16 ANNEXURE –JANUARY-2G

Audit Results for Network Availability- PMR data-January											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1972	10732	6900	2303	1746	2736	2292	4577	4539	11410
Sum of downtime of BTSs in a month (in hours)		815	2444	96777	5025	770	2843	623	1229	5197	7451
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.03%	1.89%	0.29%	0.06%	0.14%	0.04%	0.04%	0.15%	0.09%
Number of BTSs having accumulated downtime >24 hours		0	0	126	0	2	33	0	0	10	26
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.83%	0.00%	0.11%	1.21%	0.00%	0.00%	0.22%	0.23%
Live Measurement Results for Network Availability- 3 Day live data-January											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1971	10727	6900	2303	1746	2736	2292	4577	4532	11410
Sum of downtime of BTSs in a month (in hours)		128	137	8917	543	28	290	62	122	543	542
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	0.02%	1.79%	0.03%	0.02%	0.15%	0.00%	0.00%	0.17%	0.01%
Number of BTSs having accumulated downtime >24 hours		0	0	8	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.12%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.25%	97.61%	97.12%	97.33%	97.39%	96.71%	98.48%		98.11%	99.38%
SDCCH/Paging channel congestion	≤ 1%	0.11%	0.09%	0.49%	0.50%	NA	0.19%	NA		0.35%	0.70%
TCH congestion	≤ 2%	0.13%	0.45%	1.03%	1.55%	1.18%	0.49%	0.00%		0.63%	0.62%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.57%	97.56%	96.62%	98.20%	98.67%	95.85%	98.59%		98.12%	99.38%
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.11%	0.44%	0.55%	NA	0.22%	NA		0.99%	0.70%
TCH congestion	≤ 2%	0.04%	0.69%	1.16%	1.60%	0.77%	0.55%	0.00%		0.85%	0.62%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-January											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		50607240	13241834	113067900	691032016	113512045	41575800	35305870		251570064	15792597
Total number of calls dropped		377366	88720	1415143	4343630	124546	43323	288254		1287538	121619
Call drop rate	≤ 2%	0.75%	0.67%	1.25%	0.63%	0.11%	0.10%	0.82%	NA	0.51%	0.77%
Total number of cells in the network		5957	32781	20277	34682	5232	8160	180100		13740	34631
Total number of cells having more than 3% TCH		219	502	576	779	91	42	3926		213	949
Worst affected cells having more than 3% TCH	≤ 3%	3.68%	1.53%	2.84%	2.25%	1.73%	0.51%	2.18%	NA	1.55%	2.74%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-January											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		60161451	13417500	11511121	691032016	17056657	4934622	5305870		22155521	15792597
Total number of calls dropped		338291	87009	129550	4343630	26673	5431	88254		122183	121619
Call drop rate	≤ 2%	0.56%	0.65%	1.13%	0.70%	0.16%	0.11%	1.66%	NA	0.55%	0.78%
Total number of cells in the network		5957	32781	20277	34682	5132	8160	80100		13740	34631
Total number of cells having more than 3% TCH		176	546	584	779	112	48	926		195	949
Worst affected cells having more than 3% TCH	≤ 3%	2.95%	1.67%	2.88%	2.30%	2.18%	0.59%	1.16%	NA	1.42%	2.63%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-January											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7417252817	2091712536	113067900	77072433262	NA	5655117217	696453983	12307705880	44592195880	2310610689
Total number of calls with good voice quality		7047757046	2031335637	109044999	75177310834	NA	5589966851	679239957	11988030129	43312306175	2238826476
%age calls with good voice quality	≥ 95%	95.02%	97.11%	96.44%	97.54%	98.90%	98.85%	97.53%	97.40%	97.13%	96.89%
Live measurement results for Voice quality-3 Day data-January											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		8874710559	2127505820	11511121	77072433262	NA	693160412	96453983	12307705880	3789487338	2310610689
Total number of calls with good voice quality		8461065753	2067671864	11134052	75177310834	NA	685057872	79239957	11988030129	3668393247	2238826476
%age calls with good voice quality	≥ 95%	95.34%	97.19%	96.72%	97.54%	98.90%	98.83%	98.20%	97.40%	96.80%	97.50%
Drive test results for Voice quality (Average of three drive tests) - DT data-January											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-January											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		76	483	63	962	118	45	405	198	26	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18971	298277	104265	1157080	26220	25611	79247	68636	137132	289200
Traffic served for all POIs (B)- in erlangs		12313	173372	56343	317579	6266	13075	30633	33807	77564	157597
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	502	63	962	119	48	405	198	25	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18433	282355	104054	1157080	26676	25592	79247	68636	140092	289200
Traffic served for all POIs (B)- in erlangs		5841	167518	60012	317579	3769	6879	30633	33807	79959	157597
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

17 ANNEXURE –FEBRUARY-2G

Audit Results for Network Availability- PMR data-February											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1974	10740	6900	11777	1744	2736	1952	4692	4551	11210
Sum of downtime of BTSs in a month (in hours)		669	77	92568	4726	441	3190	420	21177	5419	4567
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	0.00%	1.80%	0.05%	0.03%	0.16%	0.03%	0.61%	0.16%	0.05%
Number of BTSs having accumulated downtime >24 hours		1	0	25	6	1	46	0	0	17	20
Worst affected BTSs due to downtime	≤ 2%	0.05%	0.00%	0.36%	0.05%	0.06%	1.68%	0.00%	0.00%	0.37%	0.18%
Live Measurement Results for Network Availability- 3 Day live data-February											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1971	10735	6900	11777	1746	2736	1952	4692	4532	11410
Sum of downtime of BTSs in a month (in hours)		128	227	8917	771	40	253	6	1363	532	887
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	0.03%	1.79%	0.09%	0.03%	0.13%	0.00%	0.40%	0.16%	0.11%
Number of BTSs having accumulated downtime >24 hours		0	0	8	0	1	0	0	0	0	1
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.12%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.01%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.25%	97.59%	99.78%	98.06%	98.51%	98.43%	98.61%	99.53%	98.08%	99.06%
SDCCH/Paging channel congestion	≤ 1%	0.13%	0.12%	0.53%	0.69%	NA	0.16%	NA	0.13%	0.34%	0.00%
TCH congestion	≤ 2%	0.17%	0.60%	1.13%	1.48%	1.10%	0.67%	0.23%	0.18%	0.76%	0.00%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.57%	97.52%	96.62%	97.86%	98.83%	97.82%	98.67%	99.57%	97.89%	99.10%
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.11%	0.44%	0.79%	#DIV/0!	0.17%	#DIV/0!	0.14%	0.27%	0.26%
TCH congestion	≤ 2%	0.04%	0.64%	1.16%	1.68%	1.14%	0.71%	0.04%	0.10%	0.80%	0.51%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-February											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		47371167	13680544	112013729	652935145	154737737	46825877	31060168	85445250	199549121	4872684205
Total number of calls dropped		322651	90167	1229094	4022691	166312	50875	253858	213919	2110389	35069123
Call drop rate	≤ 2%	0.68%	0.66%	1.10%	0.62%	0.11%	0.11%	0.82%	0.25%	1.06%	0.78%
Total number of cells in the network		5957	32796	20277	34894	5226	8160	5725	13913	13776	1004299
Total number of cells having more than 3% TCH		169	573	592	742	101	43	181	263	717	27386
Worst affected cells having more than 3% TCH	≤ 3%	2.84%	1.75%	2.92%	2.13%	1.93%	0.53%	3.16%	1.89%	5.20%	2.90%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-February											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		60161451	13559847	11511121	68261516	16808537	4775625	4313226	9453801	22227251	16802359
Total number of calls dropped		338291	88547	129550	474018	16803	4943	31120	41015	236197	120928
Call drop rate	≤ 2%	0.56%	0.65%	1.13%	0.69%	0.10%	0.10%	0.72%	0.43%	1.06%	0.72%
Total number of cells in the network		5957	32789	20277	34664	5232	8160	5860	13909	13720	34631
Total number of cells having more than 3% TCH		176	552	584	932	65	35	173	278	720	944
Worst affected cells having more than 3% TCH	≤ 3%	2.95%	1.68%	2.88%	2.69%	1.24%	0.42%	2.95%	2.00%	5.25%	2.73%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-February											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		7881719383	2104121713	108279675	73114794190	NA	6696606684	600763891	9434827692	38726819530	68826376299
Total number of calls with good voice quality		7491468659	2042724242	104663134	71390933342	NA	6618681593	594874541	9182090951	37750145317	66756910228
%age calls with good voice quality	≥ 95%	95.05%	97.08%	96.66%	97.64%	98.88%	98.84%	99.02%	97.32%	97.48%	96.50%
Live measurement results for Voice quality-3 Day data-February											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		8874710559	24522184854	11511121	7743267624	NA	677176580	71100134	1212955227	4197184864	2373323321
Total number of calls with good voice quality		8461065753	23824347168	11134052	7565374256	NA	669287983	68373869	1181041570	4089844775	2301962422
%age calls with good voice quality	≥ 95%	95.34%	97.15%	96.72%	97.70%	98.90%	98.84%	96.17%	97.37%	97.44%	96.99%
Drive test results for Voice quality (Average of three drive tests) - DT data-February											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-February											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	494	63	963	119	49	392	192	27	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18464	304913	104054	1158552	26575	25819	76559	66944	163410	289212
Traffic served for all POIs (B)- in erlangs		12578	178295	60012	322439	6541	14137	30650	34388	84557	161518
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	509	63	963	119	48	392	192	26	209
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		18433	293647	104054	1158552	25039	24276	76435	67412	216483	289212
Traffic served for all POIs (B)- in erlangs		5841	177736	60012	322439	6401	13749	30433	35588	88497	161518
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-March											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1975	10745	6900	11829	1736	2730	1920	4692	4521	4327
Sum of downtime of BTSs in a month (in hours)		639	2404	97312	5045	2847	2715	645	25225	6625	12937
BTSs accumulated downtime (not available for service)	≤ 2%	0.04%	0.03%	1.90%	0.06%	0.22%	0.13%	0.05%	0.72%	0.20%	0.40%
Number of BTSs having accumulated downtime >24 hours		0	0	123	14	28	29	0	0	32	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.78%	0.12%	1.61%	1.06%	0.00%	0.00%	0.71%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-March											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		1968	10792	6900	11829	1730	2725	1920	4692	4523	4327
Sum of downtime of BTSs in a month (in hours)		64	216	9462	422	301	549	33	2508	707	927
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	0.03%	1.90%	0.05%	0.24%	0.28%	0.02%	0.74%	0.22%	0.30%
Number of BTSs having accumulated downtime >24 hours		0	0	7	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.30%	98.53%	96.35%	98.09%	98.61%	95.21%	98.41%	97.87%	98.17%	99.26%
SDCCH/Paging channel congestion	≤ 1%	0.13%	0.11%	0.59%	0.56%	NA	0.23%	NA	0.12%	0.29%	0.48%
TCH congestion	≤ 2%	0.17%	0.60%	1.28%	1.36%	0.20%	0.56%	0.56%	0.17%	0.67%	0.74%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.62%	98.46%	96.54%	97.05%	98.67%	97.44%	98.49%	97.22%	98.38%	99.49%
SDCCH/Paging channel congestion	≤ 1%	0.06%	0.13%	0.50%	0.68%	NA	0.20%	NA	0.15%	0.38%	0.30%
TCH congestion	≤ 2%	0.04%	0.79%	1.26%	1.47%	0.16%	0.36%	0.59%	0.22%	0.66%	0.51%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		1293	2080	2223	2270	2248	2115	1986	2239	2265	2317
Total number of successful calls established		1270	2077	2146	2265	2193	2081	1985	2231	2261	2308
CSSR	≥ 95%	98.22%	99.86%	96.54%	99.78%	97.55%	98.39%	99.95%	99.64%	99.82%	99.61%
%age blocked calls		1.78%	0.14%	3.46%	0.22%	2.45%	1.61%	0.05%	0.36%	0.18%	0.39%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-March											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		51426207	412268052	107856625	706036335	108443532	46473219	33105006	90539455	226340849	441397212
Total number of calls dropped		333246	2580508	1214912	4232478	104351	53377	220731	416585	2264698	3295109
Call drop rate	≤ 2%	0.65%	0.63%	1.13%	0.60%	0.10%	0.11%	0.67%	0.46%	1.00%	0.75%
Total number of cells in the network		5961	32945	20277	35076	5202	8142	5621	13915	13682	945
Total number of cells having more than 3% TCH		155	588	553	743	29	31	142	266	686	32
Worst affected cells having more than 3% TCH	≤ 3%	2.60%	1.79%	2.73%	2.12%	0.55%	0.38%	2.52%	1.91%	5.02%	3.39%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-March											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		61128832	11292607	10889126	66464503	4647448	4739396	3648485	8352632	21283344	40728097
Total number of calls dropped		311646	72440	122291	347382	4444	1551	22470	36310	221119	282627
Call drop rate	≤ 2%	0.51%	0.64%	1.12%	0.52%	0.10%	0.03%	0.62%	0.43%	1.04%	0.69%
Total number of cells in the network		5950	32949	20277	34983	5184	8127	5714	13858	13688	962
Total number of cells having more than 3% TCH		138	575	565	617	27	8	122	245	810	30
Worst affected cells having more than 3% TCH	≤ 3%	2.31%	1.75%	2.79%	1.76%	0.52%	0.10%	2.14%	1.77%	5.92%	3.12%

Audit Results for Voice quality -PMR Data-March											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		8471394309	4007100225	107856625	78268576260	NA	6559009883	9502158749	13470931927	39793460705	73750104277
Total number of calls with good voice quality		8114618826	3883796026	104220429	76670229747	NA	6509585739	921636518	13134600880	38786935556	71558693946
%age calls with good voice quality	≥ 95%	95.79%	96.92%	96.63%	97.96%	99.48%	99.25%	99.90%	97.50%	97.47%	97.03%
Live measurement results for Voice quality-3 Day data-March											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		9154033403	3960021168	10889126	7646298610	NA	667077732	690681372	1277016756	4143511350	7173601188
Total number of calls with good voice quality		8871345316	3840361875	10598337	7513569043	NA	662321912	93691655	1246625392	4039780088	6969705452
%age calls with good voice quality	≥ 95%	96.91%	96.98%	97.33%	98.26%	98.26%	99.29%	99.86%	97.62%	97.50%	97.16%
Drive test results for Voice quality (Average of three drive tests) - DT data-March											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		183361	1260379	291671	602265	0	0	0	4481138	276672	881677
Total number of calls with good voice quality		176764	1227071	258720	582368	0	0	0	4377313	266268	851935
%age calls with good voice quality	≥ 95%	96.40%	97.36%	88.70%	96.70%	NA	NA	NA	97.68%	96.24%	96.63%

Audit Results for POI Congestion- PMR data-March											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		78	506	63	954	117	46	392	192	26	67
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19007	302485	104498	1150830	23935	26869	76435	67412	141266	5819632
Traffic served for all POIs (B)- in erlangs		12501	174138	57024	308518	6311	13358	30863	33639	85163	5840995
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
NDR		78	505	63	957	117	47	392	192	26	67
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		19265	299682	102199	1153976	21140	27191	70290	65446	141548	5819632
Traffic served for all POIs (B)- in erlangs		6111	166960	56773	304362	7081	14104	31420	33360	86680	5840995
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2692	2307	3044	5924
Sum of downtime (i.e. total outage time) of Node Bs		NDR	38012	5056	45	7529
Node Bs downtime (not available for service)	≤ 2%	NDR	1.90%	0.29%	0.00%	0.17%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	47	0	0	9
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.75%	0.00%	0.00%	0.15%
Live Measurement Results for Network Availability- 3 Day live data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2692	2307	3046	5924
Sum of downtime (i.e. total outage time) of Node Bs		NDR	38012	502	0	7529
Node Bs downtime (not available for service)	≤ 2%	NDR	1.90%	0.03%	0.00%	0.17%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	47	0	0	8
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.75%	0.00%	0.00%	0.14%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.58%	99.63%	98.75%	99.72%
RRC Congestion	≤ 1%	NDR	0.81%	0.30%	0.75%	0.21%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.57%	0.06%	0.99%	0.08%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.58%	99.65%	98.77%	98.56%
RRC Congestion	≤ 1%	NDR	0.81%	0.40%	0.75%	0.11%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.57%	0.08%	0.98%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	24369308	1265740243	28725010	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	369528	18351418	143519	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.52%	1.47%	0.55%	0.28%
Total no. of cells in the licensed service area (B)		NDR	8114	26465	9028	18421
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	230	546	261	324
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.84%	2.10%	2.87%	2.87%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	24369308	1265740243	28725010	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	369528	18351418	143519	NDR
Call drop rate (B/A*100)	≤ 2%	NDR	1.52%	1.46%	0.60%	1.03%
Total no. of cells in the licensed service area (B)		NDR	8114	26465	9028	18462
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	230	546	261	320
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.84%	2.15%	2.90%	2.90%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	235419028719	735290382384	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	232153599220	640325514903	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.69%	87.08%	98.91%
Live measurement results for Voice quality-3 Day data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	235419028719	735290382384	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	232153599220	640325514903	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	99.10%	87.08%	99.03%
Drive test results for Voice quality (Average of three drive tests) - DT data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	962	192	NA
No. of POIs not meeting benchmark		NDR	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		NDR	104265	1157080	66944	NA
Traffic served for all POIs (B)- in erlangs		NDR	56343	317579	34388	NA
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	NA
Live Measurement Results for POI Congestion- 3 Day data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	962	192	NA
No. of POIs not meeting benchmark		NDR	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		NDR	104265	1157080	66944	NA
Traffic served for all POIs (B)- in erlangs		NDR	56343	317579	34388	NA
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	NA

20 ANNEXURE – FEBRUARY-3G

Audit Results for Network Availability- PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2692	7950	3041	6024
Sum of downtime (i.e. total outage time) of Node Bs		NDR	35988	2185	42	7820
Node Bs downtime (not available for service)	≤ 2%	NDR	1.80%	0.04%	0.00%	0.17%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	39	2	0	29
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.45%	0.03%	0.00%	0.48%
Live Measurement Results for Network Availability- 3 Day live data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2692	7950	776	6024
Sum of downtime (i.e. total outage time) of Node Bs		NDR	3535	504	4	6530
Node Bs downtime (not available for service)	≤ 2%	NDR	1.82%	0.09%	0.01%	1.51%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	1	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.04%	0.00%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.53%	99.67%	98.76%	99.70%
RRC Congestion	≤ 1%	NDR	0.88%	0.30%	0.71%	0.34%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.39%	0.10%	1.00%	0.12%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.32%	99.60%	87.06%	98.60%
RRC Congestion	≤ 1%	NDR	0.86%	0.25%	0.40%	0.79%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.75%	0.11%	0.79%	0.56%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	25061439	148377166	28725010	84060951
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	348912	335169	143519	200848
Call drop rate (B/A*100)	≤ 2%	NDR	1.39%	0.23%	0.50%	0.24%
Total no. of cells in the licensed service area (B)		NDR	8114	27450	9028	18689
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	205	360	261	323
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.53%	1.31%	2.89%	1.73%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	2623201	16036186	3045754	7580135
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	34203	35040	13852	66981
Call drop rate (B/A*100)	≤ 2%	NDR	1.30%	0.22%	0.45%	0.88%
Total no. of cells in the licensed service area (B)		NDR	8021	28022	9058	18689
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	233	291	246	303
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.90%	1.04%	2.71%	1.62%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	222336488277	76068883500	219077746510
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	219274580708	75827701815	216688365008
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.62%	99.68%	98.91%
Live measurement results for Voice quality-3 Day data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	24001109775	8128257000	109538873255
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	332168406	25491668	107344182514
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.62%	99.69%	98.00%
Drive test results for Voice quality (Average of three drive tests) - DT data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	963	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104372	1159489	66944	0
Traffic served for all POIs (B)- in erlangs		NDR	59006	316283	34388	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	963	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104054	1159489	67534	0
Traffic served for all POIs (B)- in erlangs		NDR	60012	316283	35588	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

21 ANNEXURE – MARCH-3G

Audit Results for Network Availability- PMR data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2708	8011	3041	6120
Sum of downtime (i.e. total outage time) of Node Bs		NDR	36890	3276	66	6832
Node Bs downtime (not available for service)	≤ 2%	NDR	1.83%	0.05%	0.00%	0.15%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	42	3	0	29
Worst affected Node Bs due to downtime	≤ 2%	NDR	1.55%	0.04%	0.00%	0.47%
Live Measurement Results for Network Availability- 3 Day live data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		NDR	2708	8011	3006	6120
Sum of downtime (i.e. total outage time) of Node Bs		NDR	3163	435	16	6840
Node Bs downtime (not available for service)	≤ 2%	NDR	1.62%	0.08%	0.01%	1.55%
Number of Node Bs having accumulated downtime of >24 hours in a month		NDR	2	0	0	29
Worst affected Node Bs due to downtime	≤ 2%	NDR	0.07%	0.00%	0.00%	0.47%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.91%	99.64%	98.76%	99.80%
RRC Congestion	≤ 1%	NDR	0.88%	0.32%	0.89%	0.12%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.11%	0.12%	6.13%	0.04%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	NDR	95.85%	99.67%	99.47%	98.54%
RRC Congestion	≤ 1%	NDR	0.96%	0.22%	0.23%	0.09%
Circuit Switched RAB Congestion	≤ 2%	NDR	1.22%	0.10%	0.00%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		1164	2013	1678	981	2021
Total number of RRC established (B)		1164	1968	1674	981	2015
Call setup success rate (B/A*100)	≥ 95%	100.00%	97.76%	99.76%	100.00%	99.70%
%age blocked calls		0.00%	2.24%	0.24%	0.00%	0.30%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	27110336	161732731	31889805	92345981
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	365360	553944	31240	186106
Call drop rate (B/A*100)	≤ 2%	NDR	1.35%	0.34%	0.10%	0.20%
Total no. of cells in the licensed service area (B)		NDR	8162	28031	9052	19042
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	180	586	237	262
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.20%	2.09%	2.62%	1.38%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	2642535	15449433	3202313	95683210
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	31757	46752	2897	55463
Call drop rate (B/A*100)	≤ 2%	NDR	1.20%	0.30%	0.09%	0.06%
Total no. of cells in the licensed service area (B)		NDR	8162	28805	9018	19042
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NDR	234	505	221	165
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NDR	2.87%	1.75%	2.45%	0.87%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		1164	2371	1961	980	2015
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	44	1	2	1
Call drop rate (B/A*100)	≤ 2%	0.00%	1.86%	0.05%	0.20%	0.05%

Audit Results for Voice quality -PMR Data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	249601106906	88639803000	198799410756
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	246155368103	88370966077	196640521412
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.62%	99.70%	98.91%
Live measurement results for Voice quality-3 Day data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	24838255741	9499705000	9939970537
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR	24493149406	9473169231	9632026070
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	98.61%	99.72%	96.90%
Drive test results for Voice quality (Average of three drive tests) - DT data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1164	643554	0	2443183	4215241
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1164	622302	0	2427793	4057784
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	100.00%	96.70%	NA	99.37%	96.26%

Audit Results for POI Congestion- PMR data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	954	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	104498	1150830	67534	0
Traffic served for all POIs (B)- in erlangs		NDR	57024	308518	33639	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	63	957	192	0
No. of POIs not meeting benchmark		NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NDR	102199	1153976	65446	0
Traffic served for all POIs (B)- in erlangs		NDR	56773	304362	33360	0
POI congestion	≤ 0.5%	NDR	0.00%	0.00%	0.00%	0.00%

22 ABBREVIATIONS

Following terms/abbreviations have been used in this report. This section provides meaning of the abbreviations used in the report.

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JFM'16 – Refers to the quarter of January, February and March2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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